

DAEWOO

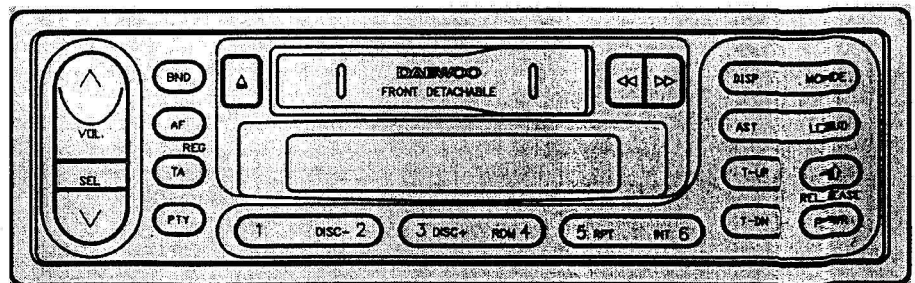
Service Manual

Car Audio

MODEL : AKF

- 4235 RDS

OPTION : CD CHANGER
LW BAND



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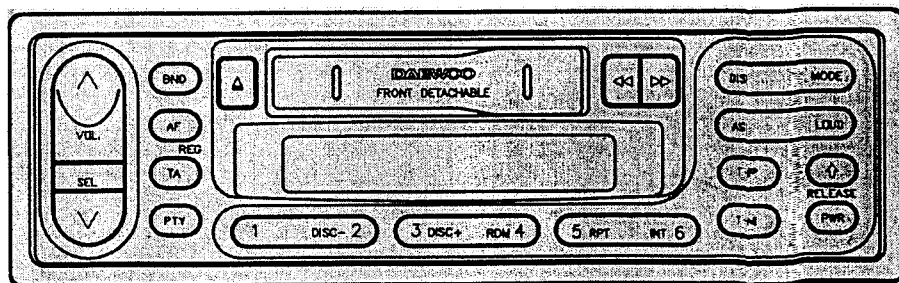
DAEW -00057

Service Manual

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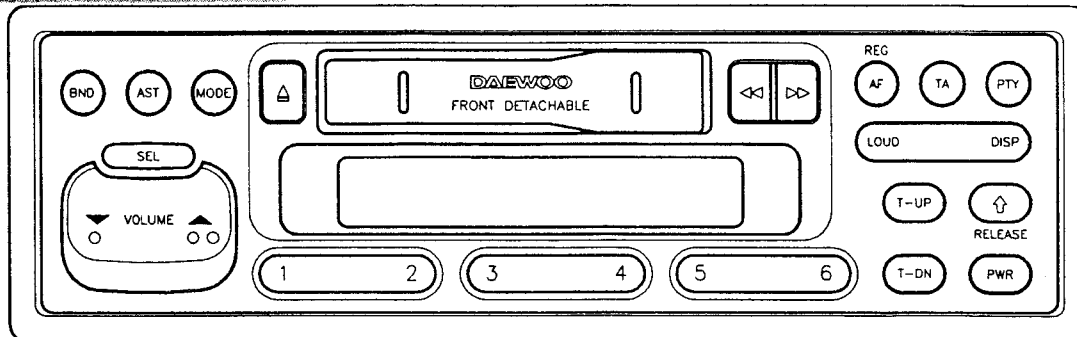
MODEL : AKF - 4085 RDS

OPTION : CD CHANGER
LW BAND

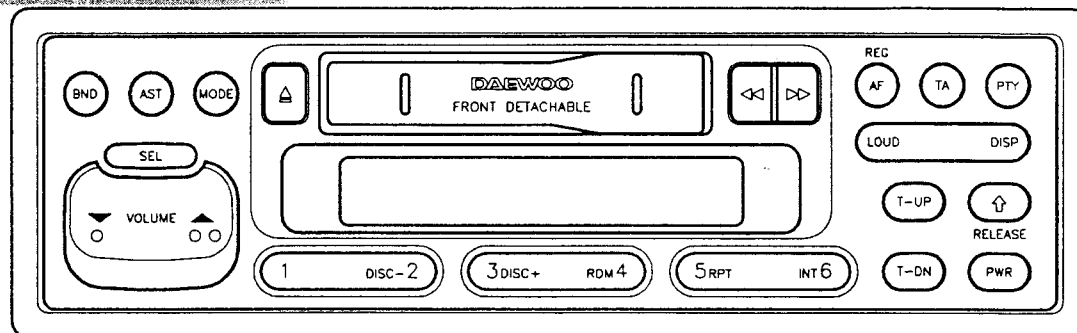


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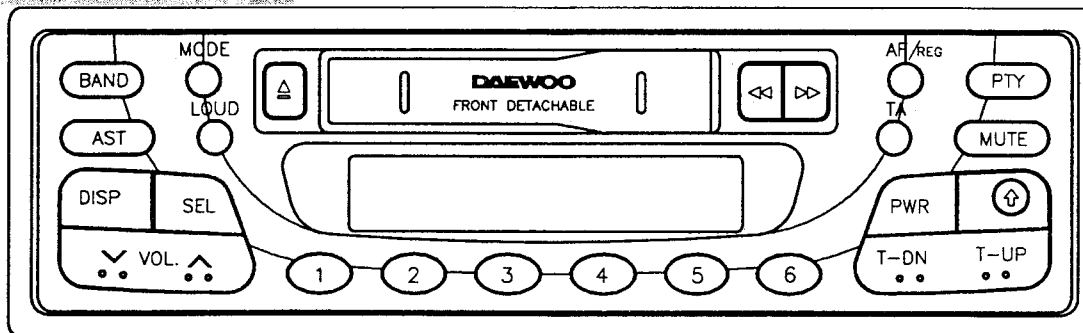
4235 RDS



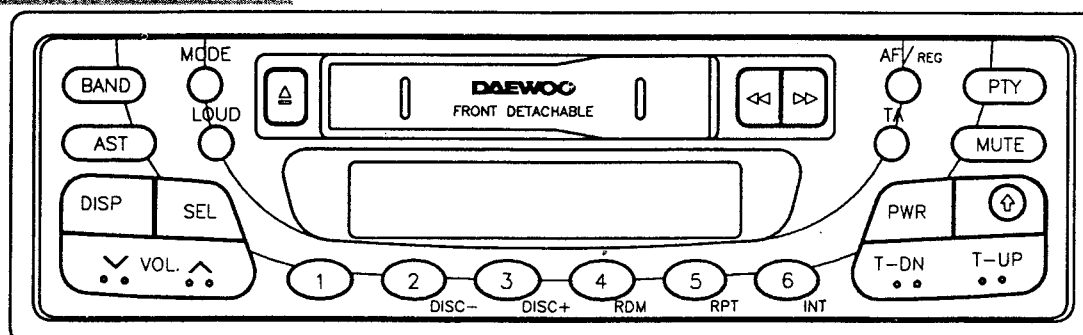
4235 RDS+CDC



4375 RDS



4375 RDS+CDC



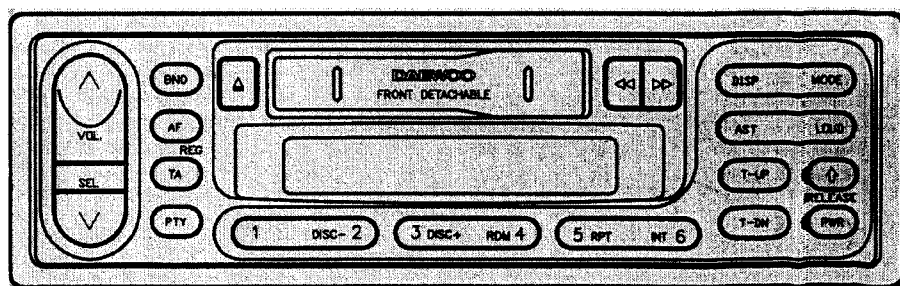
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Service Manual

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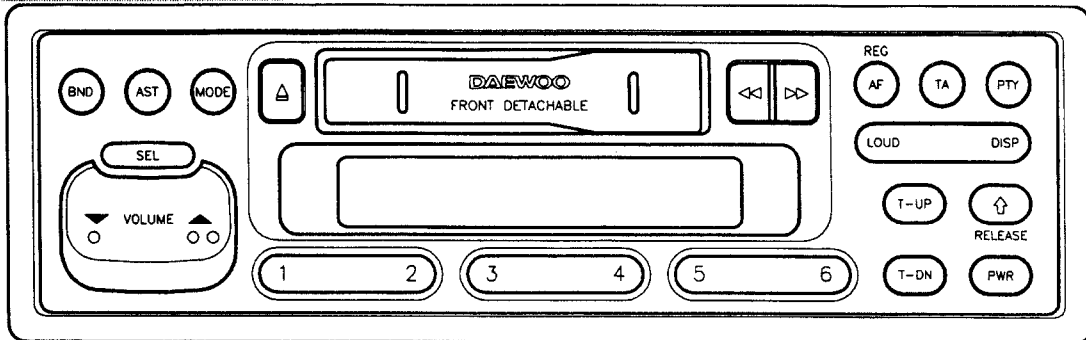
MODEL : AKF - 4085 RDS
- 4235 RDS
- 4375 RDS

OPTION : CD CHANGER
LW BAND

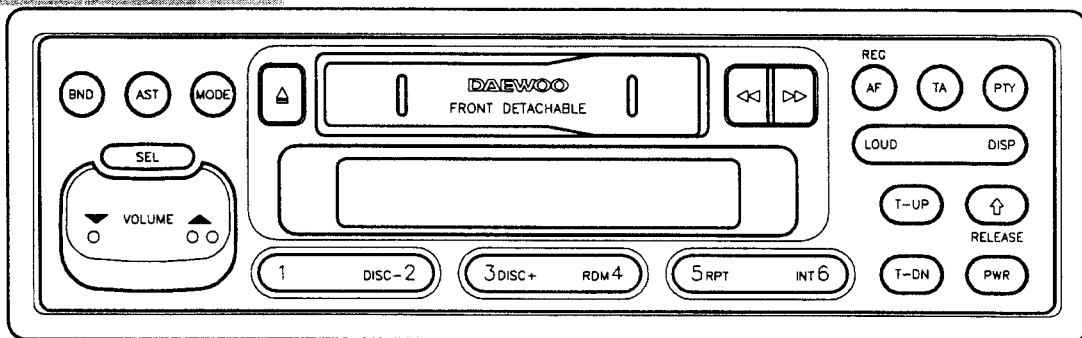


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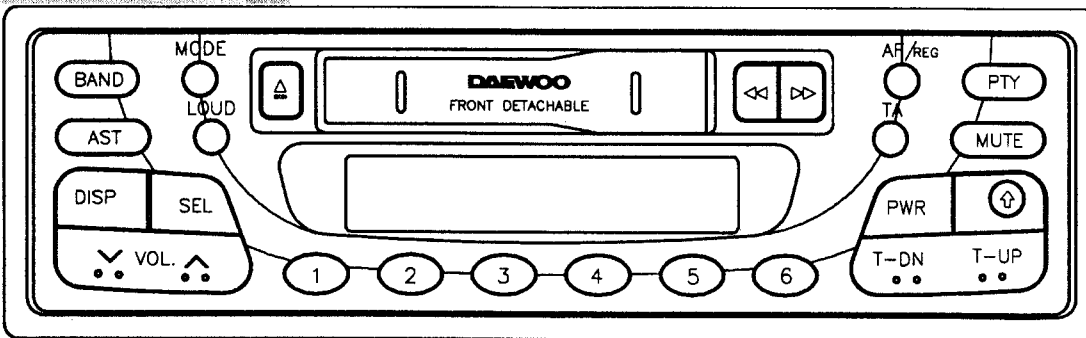
4235 RDS



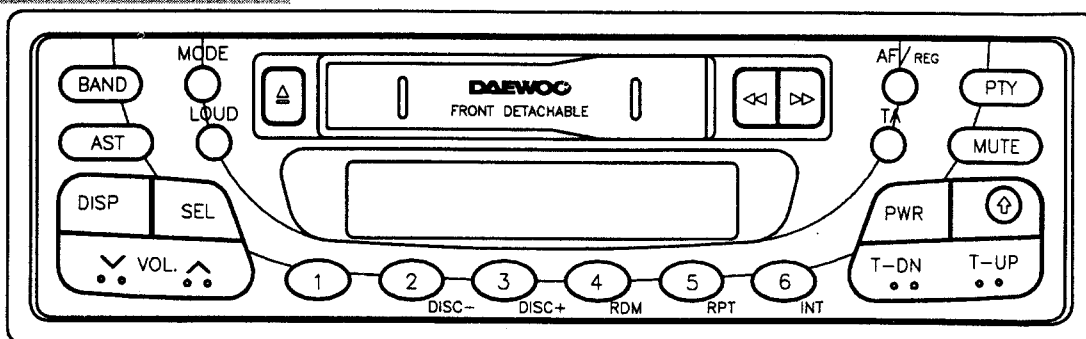
4235 RDS+CDC



4375 RDS



4375 RDS+CDC



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Specifications

< Audio Section >

Maximum output power	25 watts / Rear Speakers. 7 watts / Front Speakers.
Rated output power	Front : 4.5 watts / Rear 15 watts per channel into 4 ohms (1 kHz, 10% total harmonic distortion)
Signal to Noise ratio	Better than 45dB
Load impedance	4 ohms
Control Bass / Treble	±10dB at 100Hz / 10kHz

< Tape Section >

Track format	4-track / 2-channel system
Tape speed	4.75cm / sec
Wow / Flutter	0.15% nominal (WRMS)
Signal to Noise ratio	Better than 50dB

< Tuner Section >

(FM)

Tuning range	87.5 to 108MHz
Usable Sensitivity (30dB S/N)	
MONO	8dBu (2.5uV / 75 ohms)
Signal to noise ratio (at 60dBu)	50dB

(MW)

Tuning range	531 to 1629kHz
Usable Sensitivity	30dBuV

(LW BAND : OPTION)

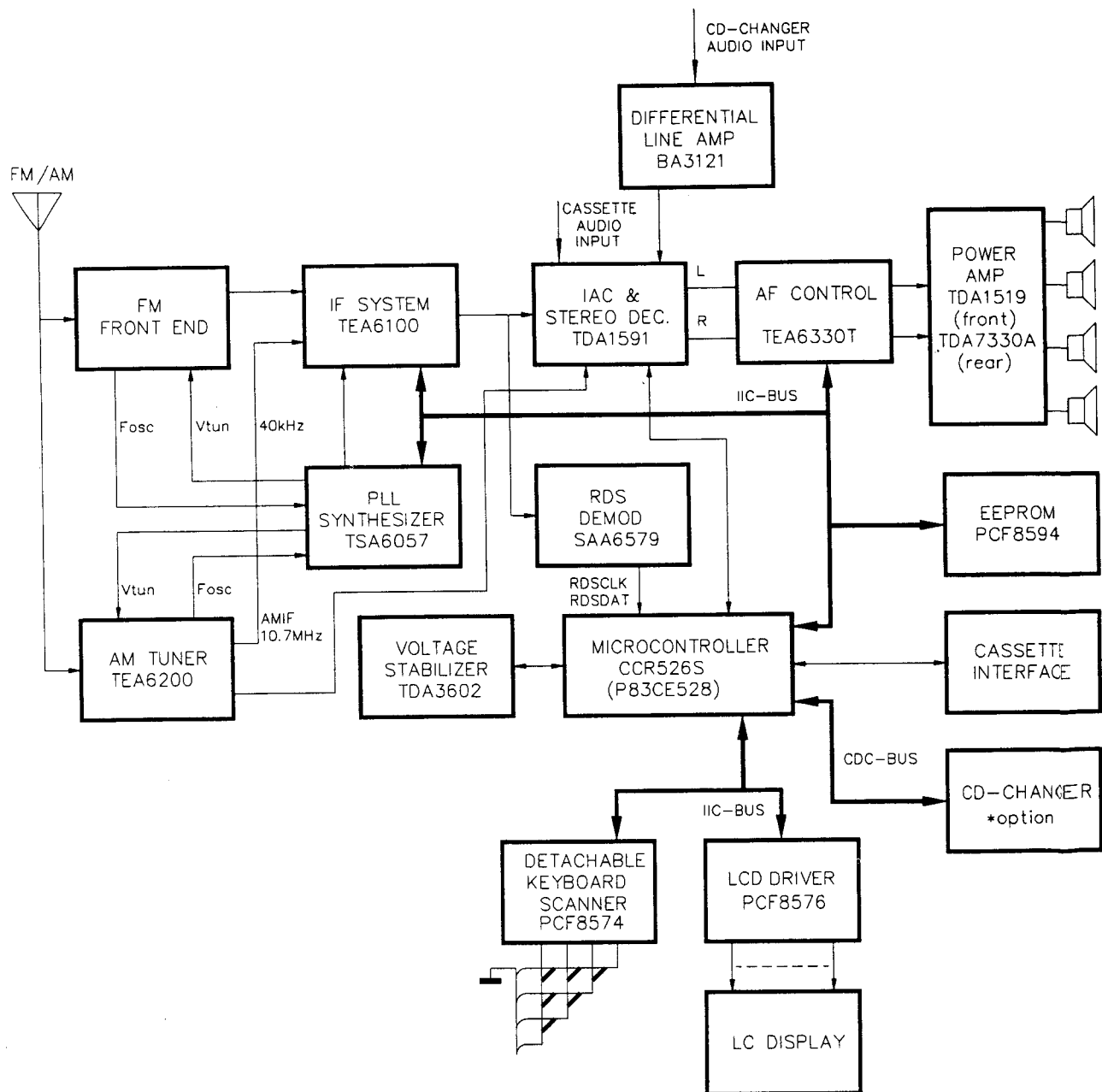
Tuning range	144 to 288kHz
Usable Sensitivity	35dBuV

< General >

Power requirements	DC 12.0V / Rated : 14.4V (Usable : 10.8 ~ 15.6V) Negative ground
Current consumption	7A Maximum
Dimension (W x H x D)	188 x 58 x 172 mm 7-3/8" x 2-1/4" x 6.77"
Chassis size	179 x 51 x 147 mm 7.05" x 2" x 5.79"
Weight (Net)	1.8kg

Design and specifications are subject to changes for improvements without notice.

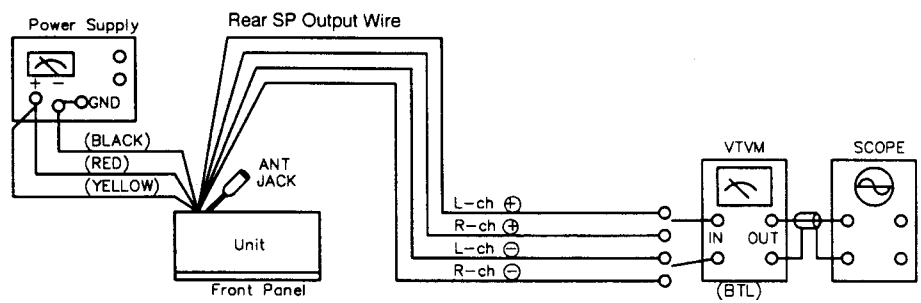
● BLOCK DIAGRAM



● ADJUSTMENTS

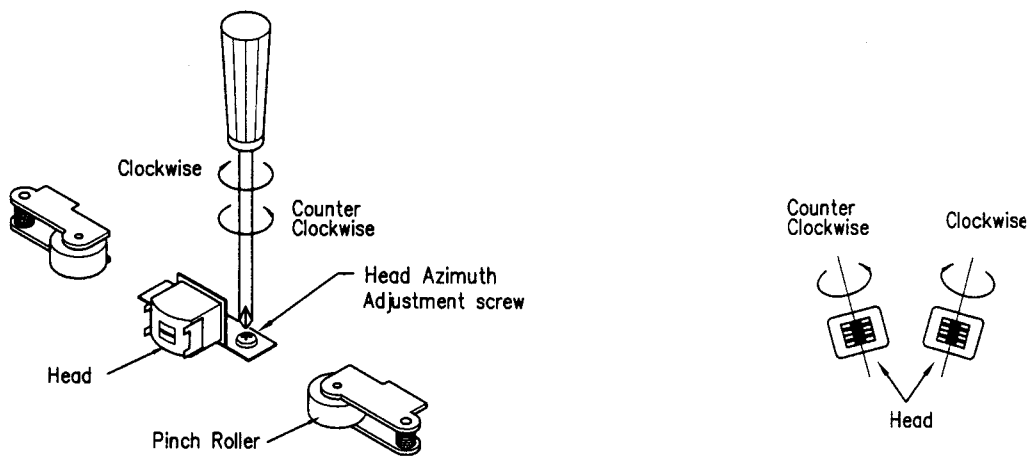
■ TAPE ADJUSTMENT

- Note :**
- 1. Clean the playback head before adjustment
 - 2. Prepare the test tape MTT-114 or equivalent (10kHz TEST TAPE)
 - 3. Balance Center position. Volume adjusted to 2Volts.
 - 4. Connections are shown in Fig. 1.



[Fig. 1]

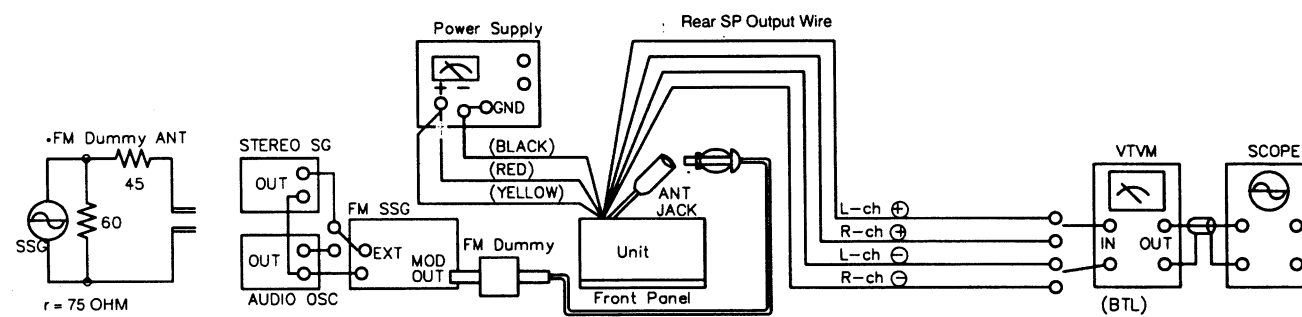
STEP	SUBJECT	INPUT SIGNAL	MEASURE OUTPUT	SETTING	ADJUST POINT	ADJUSTMENT
1	Head azimuth adjustment	MTT-114	L or R CH SP output wire VTVM and scope	Playback	Head Azimuth adjustment screw	Turn the azimuth screw to obtain maximum (see Fig. 2)



[Fig. 2]

FM AM ADJUSTMENT

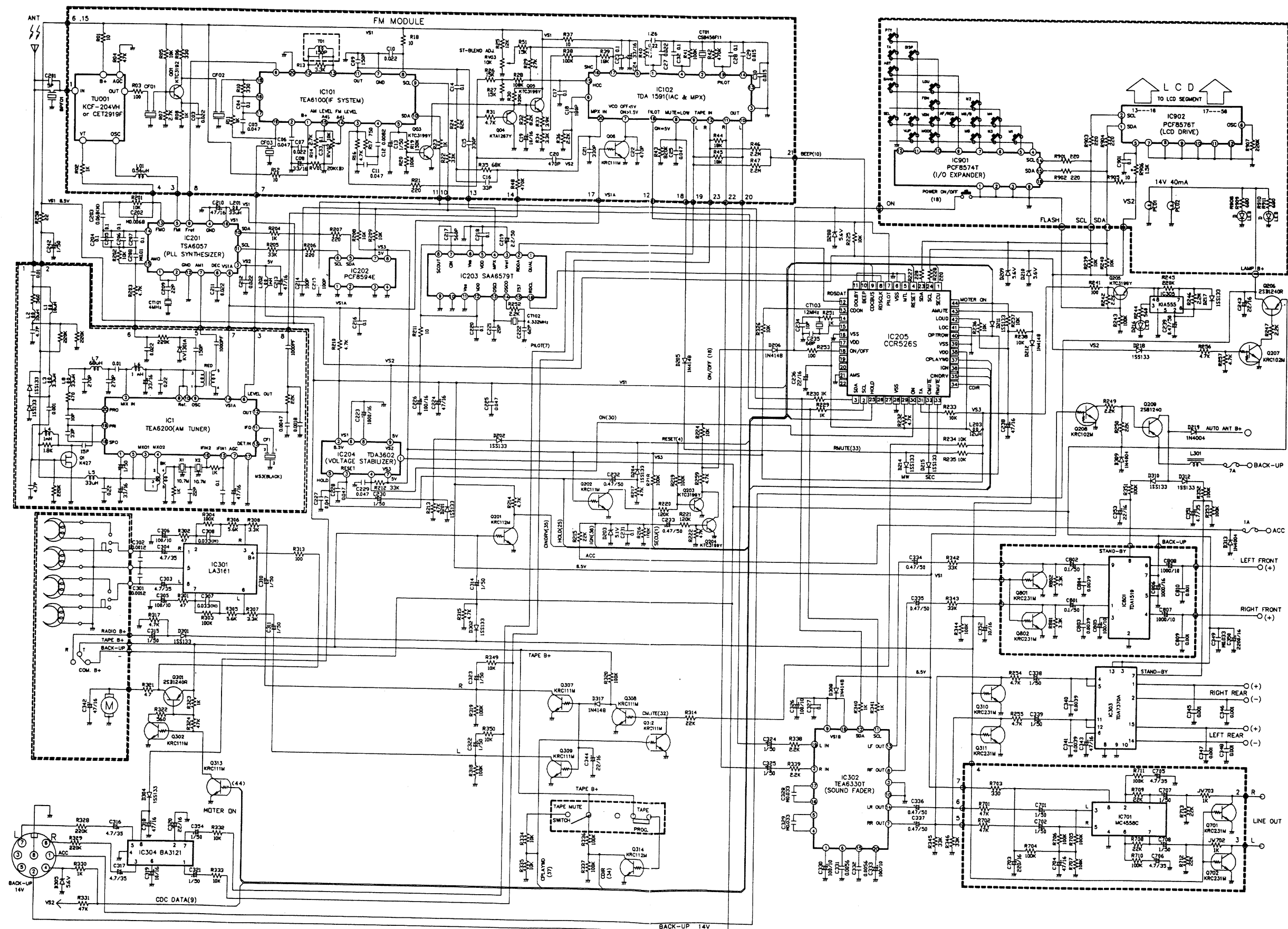
- Note :**
1. BAND - FM
 - 2 Balance..... Center position, Tone Max position, Volume adjusted to 2Volts
 3. Connections are shown in Fig. 3



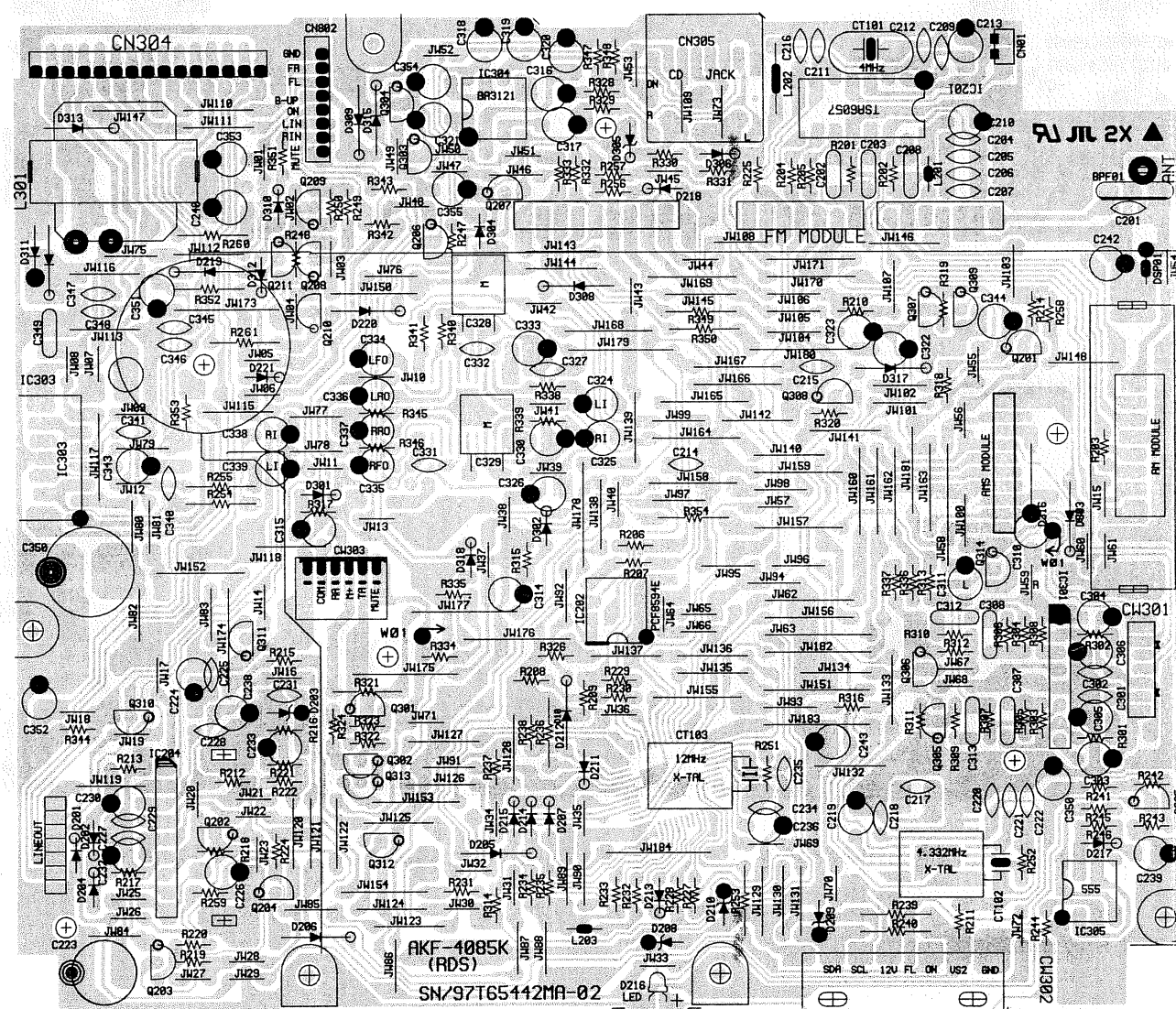
[Fig. 3]

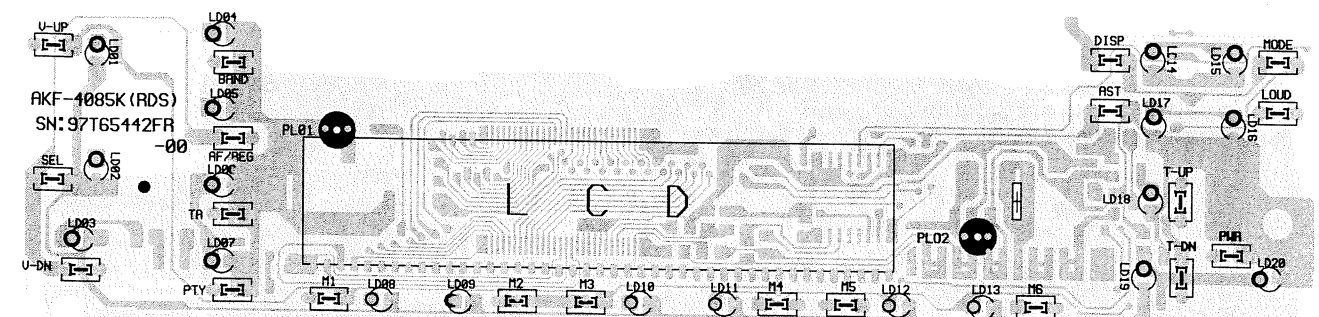
ADJUSTMENT	MODE	SIGNAL	TUNED	ADJUST	OUTPUT
Quadrature Coil	FM	98.1MHz, 20dBu fdev = 75KHz	98.1MHz	T01	for minimum THD. distortion
-3dB Sensitivity	FM	98.1MHz, 60dBu fdev = 22.5KHz fmod = 1KHz	98.1MHz	Volume up to	0dB (2 Volts)
		98.1MHz, 20dBu fdev = 22.5KHz fmod = 1KHz		RV02	-3dB drop point
STEREO Separation	FM	98.1MHz, 60dBu STEREO signal	98.1MHz	Volume up to	L and R = 0dB (2V)
		98.1MHz, 60dBu STEREO -R		RV03	L-R > 30dB
AM SEARCH LEVEL	MW	999 KHz 30dBu	98.1MHz	RV01	IC101 3pin 1.5V DC

SCHEMATIC DIAGRAM

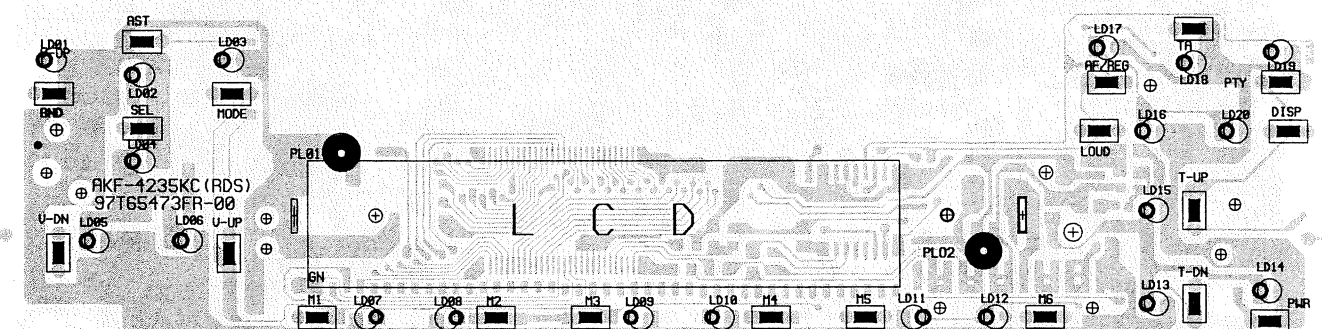
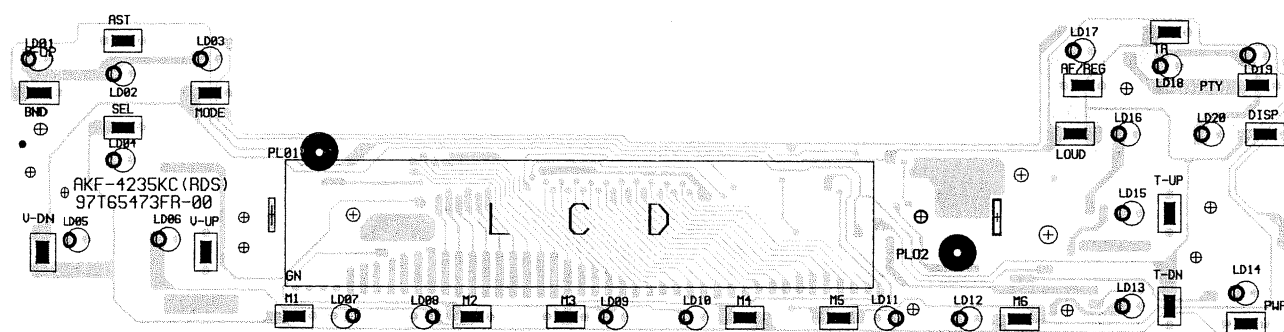


● PARTS LOCATION ON PC BOARD (1/2)

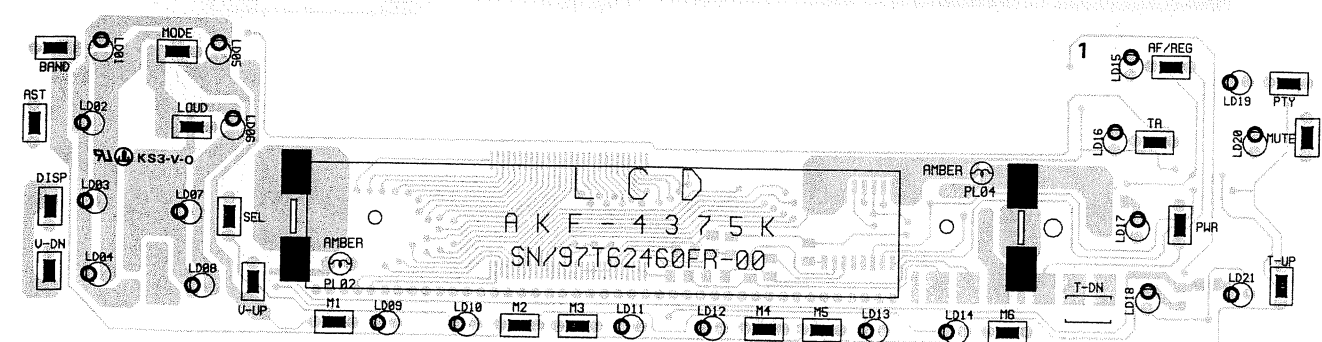
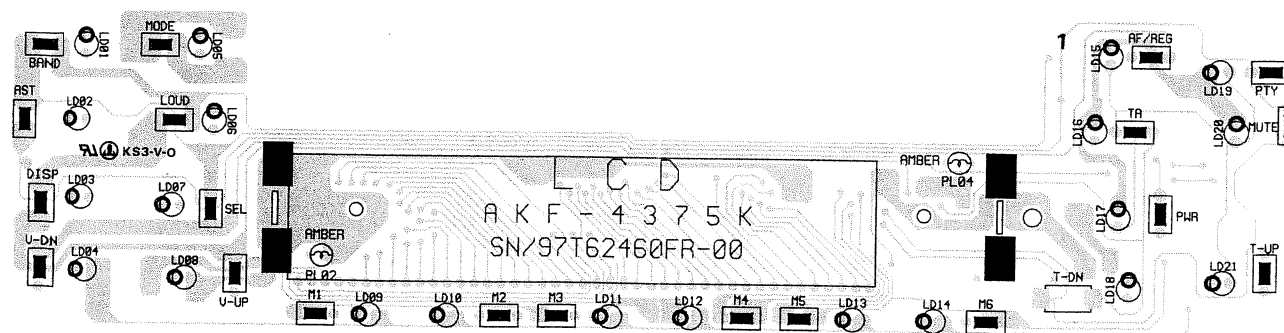
AKF-4085 RDS MAIN PCB (Parts Side)



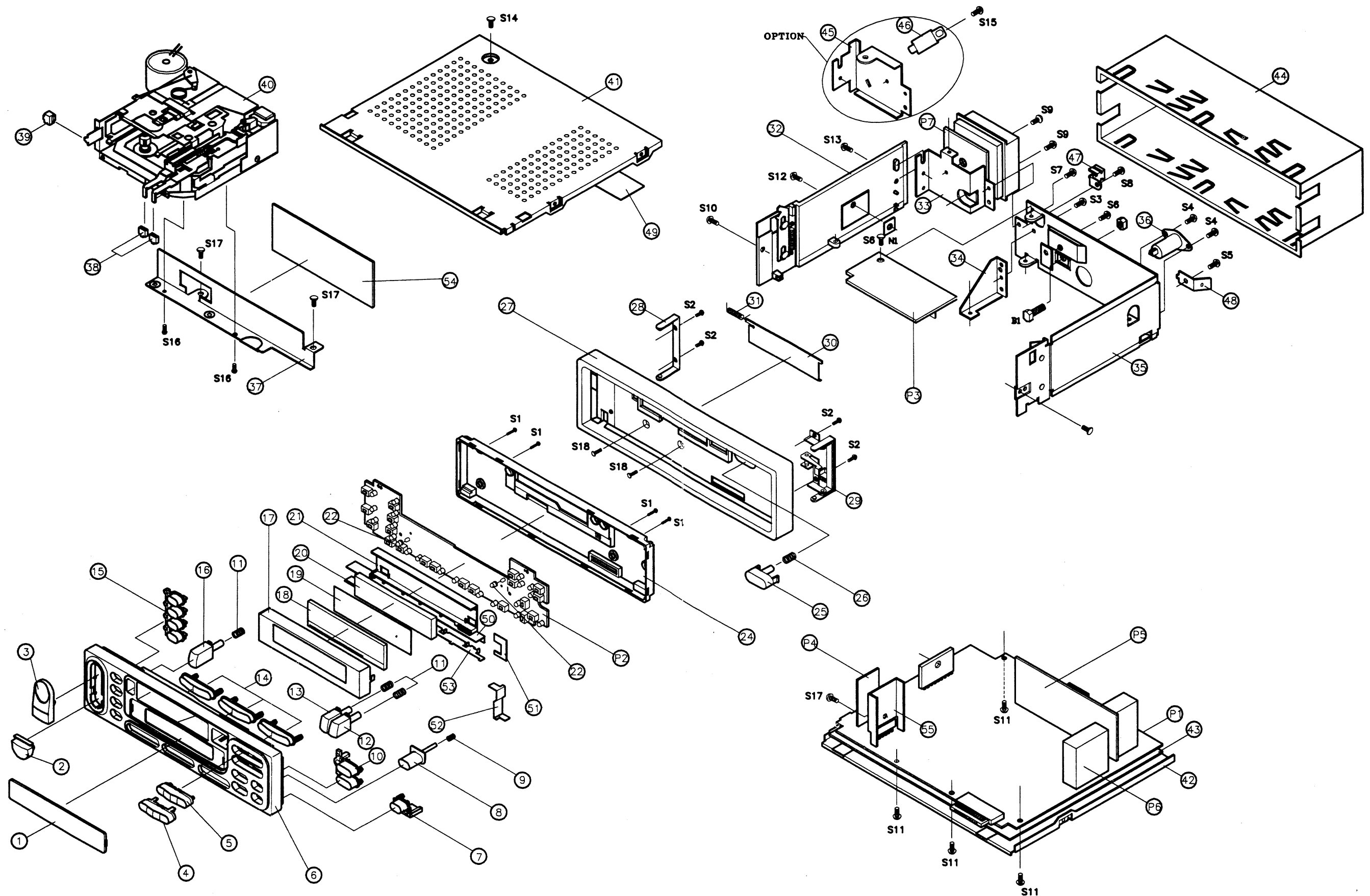
Pattern Side



Pattern Side



● EXPLODED VIEW (SET)

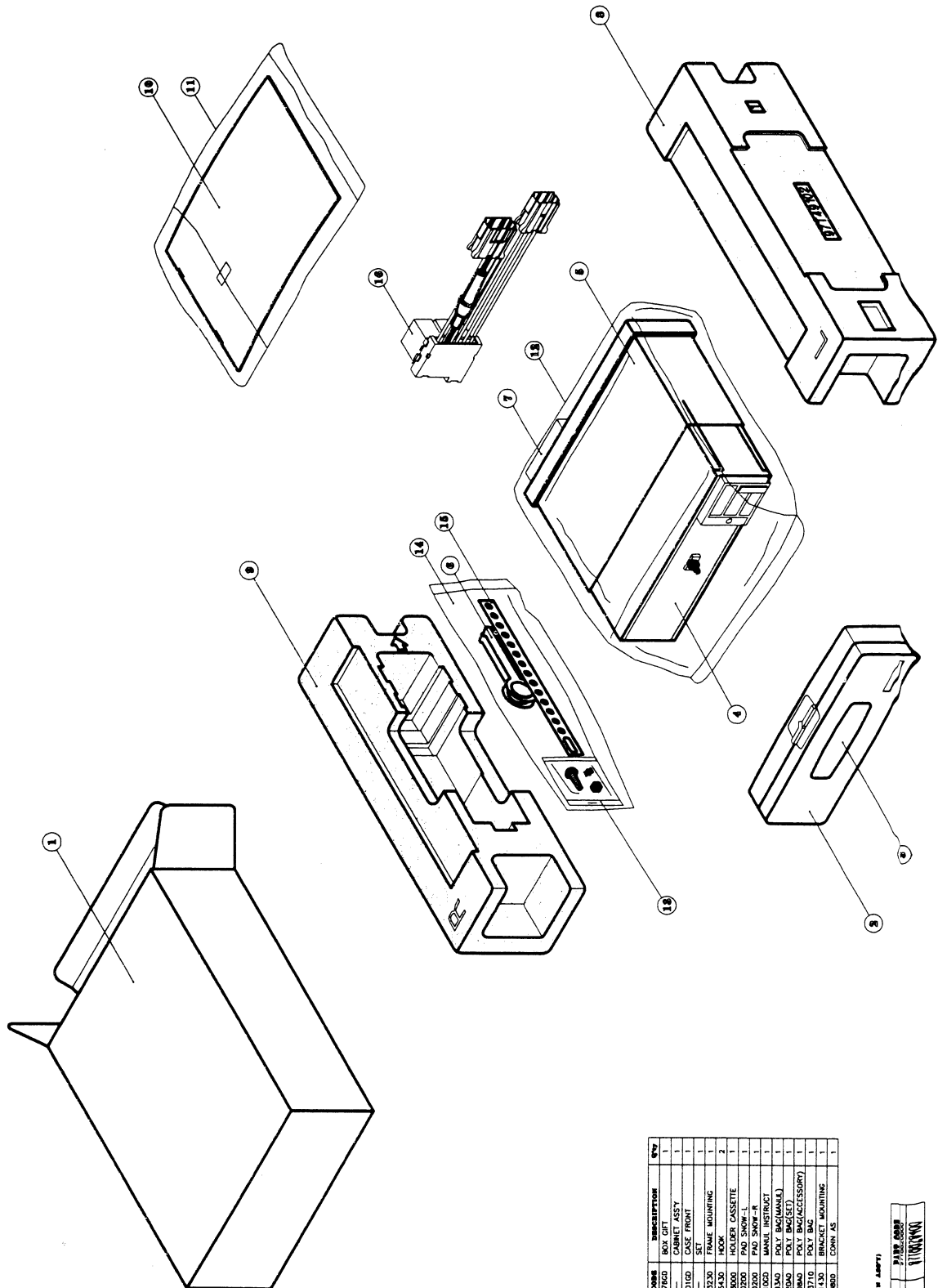


● PARTS LIST for EXPLODED VIEW (SET)

1	97T16053GD	WINDOW LCD ACRYL (IH-830)
2	97T13579GD	KNOB SELECTOR PC MILKY
3	97T13580GD	KNOB VOLUME PC MILKY
4	97T13575GD	KNOB FUNCTION 3 PC MILKY
5	97T13573GD	KNOB FUNCTION 1 PC MILKY
6	97T01031GD	CABINET FRONT ABS XR-401
7	97T13569GD	KNOB BAND PC MILKY
8	97T1357710	KNOB RELEASE ABS XR-401
9	97T3007100	SPRING KNOB DETA PW PI0.3
10	97T13576GD	KNOB POWER PC MILKY
11	97T3006900	SPRING KNOB EJ PW PI0.3
12	97T1357110	KNOB FF ABS XR-401
13	97T1357810	KNOB REW ABS XR-401
14	97T13574GD	KNOB FUNCTION 2 PC MILKY
15	97T13572GD	KNOB FUNCTION PC MILKY
16	97T1357010	KNOB EJECT ABS XR-401
17	97T0426700	COVER LCD ET T0.3
18	97T0L0746P	LCD (POSITIVE)
19	97T9604310	SHEET LCD TREPAL PAPER
20	97T2213400	REFLECTOR LCD PMMA
21	97T2305800	HOLDER LCD PC (WHITE)
22		CAP LAMP OPTION *See the page 15.
23	97T2433300	BRACKET I.C SBHG T1.0
24	97T0103010	CABINET BACK PC LEXAN
25	97T13421GD	KNOB PULL ABS XR-401
26	97T3007400	SPRING PULL PW PI0.35
27	97T14085GD	ESCUTCHEON ABS XR-401
28	97T2606000	HOOK B STS T0.4
29	97T2605700	HOOK AS SECC
30	97T18042GD	DOOR CASSETTE PC
31	97T3005610	SPRING DOOR STS-304W PI0.25
32	97T4405810	HEAT SINK AS ADC 12, SECC
33	97T2424330	BRACKET CONN SECC ISO TYPE
34	97T2418830	BRACKET DECK B SECC
35	97T0619730	CHASSIS SIDE SECC
36	97T63019A0	JACK ANT 9.2X15X30MM
37	97T2428730	BRACKET DECK SECC T1.0
38	97T0417700	CAP FF LEVER ABS XR-401
39	97T0417900	CAP EJ LEVER B ABS XR-401
40	97T6007100	DECK MECHANISM SM-909PL
41	97T0417431	COVER TOP SECC T0.6
42	97T0417531	COVER BOTTOM SECC T0.6
43	97T0911410	PLATE INSULATION POLYESTER T0.25
44	97T0617830	FRAME MOUNTING SECC T0.6
45	97T2426930	BRACKET CONN SECC, 9PIN TYPE (OPTION)

46	97T2409930	BRACKET CONN SECC T1.0 (OPTION)
47	97T5700530	STOPPER CORD SBHG1
48	97T6400130	TERMINAL EARTH SECC
49	97T0918000	PLATE POWER POLYESTER T0.25
50	97T5601100	INSULATION BRACKET PVC T0.3
51	97T5601200	INSULATION FRONT POLYESTER T0.25
52	97T2431900	BRACKET FRONT SBHG T0.5
53	97T2431400	BRACKET PCB STS T0.4
54	97T5601700	INSULATION RF POLYESTER T0.25
55	97T2433300	BRACKET IC SBHG T1.0
P1	97T65442MA	PCB MAIN AS
P2	97T65442FR	PCB FRONT AS
P3	97T65408PW	PCB POWER AS
P4	97T65408L0	PCB LINE OUT AS
P5	97T65454FM	PCB FM RF AS
P6	97TC029600	AM PACK
S1	7173201212	SCREW TAPPTITE TT2 BIN 2X12BK
S2	7173200611	SCREW TAPPTITE TT2 BIN 2X6 MFZN
S3	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S4	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S5	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S6	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S7	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S8	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S9	7171301211	SCREW TAPPTITE TT2 PAN 3X12 MFZN
S10	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S11	97T3103610	SCREW LOCK TT2 BIN 3X6 MFZN W/LOCK
S12	7003300811	SCREW MACHINE BIN 3X8 MFZN
S13	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S14	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S15	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
S16	7001300411	SCREW MACHINE PAN 3X4 MFZN
S17	7175300611	SCREW TAPPTITE TT2 FLT 3X6 MFZN
S18	7173300611	SCREW TAPPTITE TT2 BIN 3X6 MFZN
N1	7372300211	NUT SQUARE 4N-2.3 MFZN
N2	7391500011	NUT HEX 6N-1.5 MFZN
B1	97T3100310	BOLT HEX SM20C M5X12 MFZN

● PACKING ILLUSTRATION and PARTS LIST



NO	PART CODE	DESCRIPTION	QTY
1	971501760	BOX KIT	1
2	971501760	CABINET ASSY	1
3	971501760	CASE FRONT	1
4	971501760	CASE REAR	1
5	971501760	FRONT MOUNTING	1
6	971501760	HOOK	2
7	971501760	HOLDER CASSETTE	1
8	971501760	PAD SNOW-L	1
9	971501760	PAD SNOW-R	1
10	971501760	MANUAL INSTRUCT	1
11	971501760	POLY BAG(MANUAL)	1
12	971501760	POLY BAG(CASSETTE)	1
13	971501760	POLY BAG(ACCESSORY)	1
14	971501760	POLY BAG	1
15	971501760	BRACKET MOUNTING	1
16	971501760	CONN AS	1

DAEWOO
RDS-1085
1085-1085

● ELECTRICAL PARTS LIST

[MAIN PCB SECTION]

Ref	PART NO.	DESCRIPTION	REMARKS
IC201	1TSA6057--	IC PLL TSA6057	
IC202	1PCF8594E-	IC EEPROM PCF8594E-29	
IC203	1SAA6579T-	IC AUDIO SAA6579T	
IC204	1TDA3602--	IC REGULATOR TDA3602	
IC205	1CCR526S12	IC MICOM CCR526S	
IC301	1LA3161--	IC TAPE EQ LA3161	
IC302	1TEA6330T-	IC AUDIO TEA6330T	
IC303	1TDA7370A-	IC POWER AMP TDA7370A	
IC304	1BA3121--	IC ISOLAION BA3121	* CDC OPTION
IC305	1K1A555--	IC TIMER KIA555	
BPF01	5PCBPMB8--	FILTER LC BPMB8	
CN01	97T8836400	CONN AS 2P SHIELD JS2P20 70MM	* TO FM PCB CONN.
CN305	97T6304000	SOCKET DIN PCB TYPE 8PIN	* CDC OPTION
CN802	97T8830400	CONN AS EL8283-08 70MM	* TO POWER PCB CONN.
CT101	5XEZ4R000C	X-TAL HC-49U 4MHZ	
CT102	5XEZ4R332D	X-TAL HC-49U 4.332MHZ	
CT103	5XEY12R00D	X-TAL HC-49U 12MHZ	
CW302	97T62129A0	CONNECTOR 12P DETACHABLE SOCKET	* TO FRONT AS
L201	5LL330K02K	COIL INDUCTOR 33uH 02	
L202	5LL102K03K	COIL INDUCTOR 1uH 03	
L203	5LL100K02K	COIL INDUCTOR 10uH 02	
L301	5LC102P226	COIL CHOKE EI-24MM 1MH	
TU001	97T7601500	TUNER AM KEA2010R	* AM MODULE
Q201,314	TZRC112M--	TR KRC112M	* R1=100K
Q202,302,305 Q306,307,308 Q309,312,313	TZRC111M--	TR KRC111M	* R1=10K
Q203,204,205	TZTC3199Y-	TR KTC3199Y	
Q206,209,301	TZ2SB1240R	TR 2SB1240R	
Q207,208	TZRC102M--	TR KRC102M	* R1=10K, R2=10K
Q211	TZRA110M--	TR KRA110M	* R1=4.7K

[FRONT PCB SECTION]

	PART NO.	DESCRIPTION	REMARKS
CW601	97T62129B0	CONNECTOR 14P DETACHABLE SOCKET	
IC901	1PCF8574--	IC EXPANDER PCF8574T	
IC902	1PCF8576T-	IC DRIVER PCF8576T	
LCD	97T0L0746P	LCD KXN2107DAP POSITIVE	
LED	DKLA124--	LED KLA124 AMBER	* OPTION COLOR
	DKLG124--	LED KLG124 GREEN	
PL01,02	97T82L0DE4	PILOT LAMP 14V 40MA	* AMBER OPTION
	97T82L0DE6	PILOT LAMP 14V 60MA	* GREEN OPTION
	97T0420521	CAP LAMP SILICON RUBBER AMBER	* AMBER OPTION
	97T0420530	CAP LAMP SILICON RUBBER GREEN	* GREEN OPTION
SW01 ~SW20	5S50101317	SW TACT 1C-1P EVQPJH 160G	

[FM PCB SECTION]

	PART NO.	DESCRIPTION	REMARKS
CF01	5PE107MJA1	FILTER CERA SFE10.7MJA10 RED	
CF02,03	5PE107MS2A	FILTER CERA SFE10.7MS2-A	
CT01	5PSB456F11	RESONATOR CERA CSB456F11	
IC101	1TEA6100--	IC AUDIO TEA6100	* FM IF
IC102	1TDA1591--	IC MPX TDA1591	* FM MPX
L01	5LL568K02K	COIL INDUCTOR 0.56uH 02	
Q01	TZTC31920-	TR KTC3192-O	
Q03,05	TZTC3199Y-	TR KTC3199-Y	
Q04	TZTA1267Y-	TR KTA1267Y	
Q06	TZRC111M--	TR KRC111M	* R1=10K
RV01	RV4221203-	R SEMI FIXED CCO 063 20K	
RV02,03	RV4221103-	R SEMI FIXED CCO 063 10K	
T01	5107FBK464	IFT FM 7X7 BK FM Q=60 10.7M	
TU001	97T76008F1	TUNER FM KCF204VH	*OPTION
	97T7606600	TUNER FM CET2919F	

[POWER PCB SECTION]

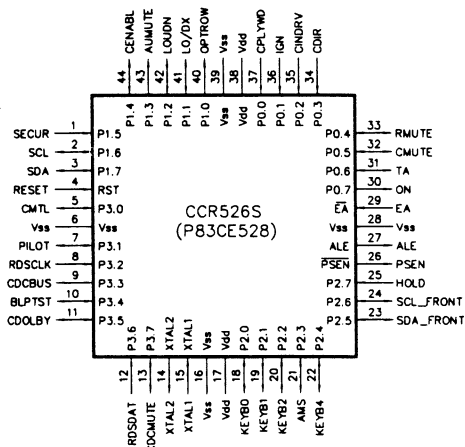
Ref	PART NO.	DESCRIPTION	REMARKS
IC801	1TDA1519-	IC AUDIO POWER	
Q801,802	TZRC231M-	TR KRC231M	

[LINE OUT PCB SECTION]

Ref	PART NO.	DESCRIPTION	REMARKS
IC701	1MC4558C-	IC OP AMP MC4558C	
Q701,702	TZRC231M-	TR KRC231M	

● FUNCTION OF IC (CCR526S MICOM)

► PINNING OVERVIEW



※ CAUTION : When Switched on while the ignition (ACC) contact is (and remains) off, the set will automatically switch off after 30 minutes.

PIN	NAME	I / O	DESCRIPTION
1	SECUR	I	<p>Security contact. Must be connected to ground via the connector of the retrack. Used to detect that the radio is removed from the retrack.</p> <p>This pin must be directly connected to ground when security is disabled by factory option diode or when the user has disabled the security code check.</p>
2	SCL	I / O	Clock line of I ² C bus
3	SDA	I / O	Data line of I ² C bus
4	RESET	I	<p>Normally low, To start the microcontroller, a high pulse of at least 20 milliseconds must be applied to this pin.</p> <p>A reset pulse must be applied when :</p> <ul style="list-style-type: none"> - Power is applied to the radio - The power key is pressed while the radio is off - The ignition contact is switched on while the radio is off - The security contact is broken (secur pin goes high) while the radio is off <p>The reset input is normally connected to the reset and hold outputs of the power stabiliser TDA3602, via a capacitor and a diode.</p>
5	CMTL	O	<p>Cassette Metal versus Ferro/Chrome mode</p> <p>High : Metal selected Low : Ferro/Chrome selected</p>
		I	If the cassette deck does not have this function, the pin must be connected to ground.

PIN	NAME	I / O	DESCRIPTION
6	Vss		Ground
7	PILOT	I O	Used to control the stereo icon on the display in the FM bands. High : Stereo pilot tone present Low : Stereo pilot tone not present When forced mono mode is selected (with the stereo / mono key), the microcontroller pulls this pin low and the TDA1591 switches to mono mode.
8	RDSCLK	I	RDS Clock line. Connected to clock output pin of RDS demodulator SAA6579
9	CDCBUS	I / O	Communication line between the CCR526S microcontroller and the CD-changer. The communication link is a one line asynchronous serial bus. Communication speed is 1 .. 2.5 msec/bit.
10	BLPTST	O I I	1. Bleep tone output signal. Normally high. This pin outputs the bleep tones. It must be merged with the normal audio signal. 2. When pulled low externally, service mode is entered. The microcontroller stops all I ² C bus transfers after completion of the last user action (within 0.5 sec. except for search tuning). This feature can be used for factory testing and preprogramming the NVM or the security code before radio leaves the factory. Option diode for source switching.
11	CDOLBY	O I	Cassette Dolby mode High : Dolby noise reduction system activated Low : Dolby noise reduction system not activated If the cassette deck does not have this function, the pin must be connected to ground.
12	RDSDAT	I	RDS Data line. Connected to data output pin of RDS demodulator SAA6579
13	CDCMUTE	O I	Controls selection of the CD-changer audio input. High : Select CD-changer audio input. Low : Mute CD-changer audio input. Option diode for FM only detection.
14 15	XTAL2 XTAL1	O I	A 12 MHz crystal is connected between these pins, controlling the internal clock oscillator. When an external clock is used, it must be applied to XTAL1.
16	Vss		Ground
17	Vdd		Power supply : +5V

	NAME	I/O	DESCRIPTION
18 ~24		I/O	Keyboard and AMS pin. Pin assignments are different for fixed front and detachable front. See relevant tables at the end of this section.
19		I	Option diode for tuning band limits and tuning grid (USA/Europe option).
20		I	Option diode for 2/4 spkrs (fader disable).
25	HOLD	I	Connected to the hold output pin of the voltage stabilizer TDA3602. This pin is used to check for power failures.
26	/PSEN	O	Program Store Enable output, used when the microcontroller runs code from an external memory. Not used by the CCR526S system. The pin will always be high.
27	ALE	O	Address Latch Enable output, used when the microcontroller accesses external memory. Not used by the CCR526S system. This pin should not be connected. In the EMC improved microprocessors (P83CE528) this pin is muted.
28	Vss		Ground
29	/EA	I	External Access input. Should be held high (with a pullup resistor) to ensure that the microcontroller runs from internal program memory (ROM).
30	ON	O	Controls the voltage stabiliser TDA3602 High : Switch supply voltages off (TDA3602 in "coma" state) Low : Switch supply voltages on (TDA3602 in "on" state)
31	TA	O	Traffic Announcement indication High : No traffic announcement Low : Traffic announcement or PTY alarm message in progress This pin can be used to raise the volume setting during traffic announcements and PTY alarm message in case no TEA6330 is used.
		I	Option diode for static on/off switch detection.
32	CMUTE	O	Controls selection of the cassette audio input source. High : Select radio source Low : Mute cassette audio source
		I	Option diode of security disable detection.
33	RMUTE	O	Controls selection of the radio input source. High : Select radio source Low : Mute radio source
		I	Option diode for LW band disable detection. (The LW band is also disabled when the option diode USA/Europe is installed.)
34	CDIR	I	Indicates the play direction of the cassette deck. Used to show the play direction on the display High : Reverse (<- arrow displayed) Low : Forward (-> arrow displayed)

PIN	NAME	I / O	DESCRIPTION
35	CINDRV	I	Indicates whether a cassette is in the cassette drive. Used to switch to cassette mode when a cassette is inserted or leaving cassette mode when a cassette is ejected. High : No cassette in drive Low : Cassette in drive
36	IGN	I	Indicates status of ignition contact or the static on/off switch (when this option is chosen). Used to switch the set on or off. High : Ignition contact / static switch on Low : Ignition contact / static switch off
37	CPLYWD	I	Indicates play/wind status of cassette deck. Used to switch to radio reception during winding. High : Wind Low : Play
38	Vdd		Power supply : +5V
39	Vss		Ground
40	OPTROW	O	Connected to the cathodes of all option diodes. During switch on, this pin is pulled low by the microcontroller to find out which option diodes are present.
41	LO/DX	O	Local/DX indication. This output can be used to control the FM tuner (switch an attenuator in the antenna input) in order to suppress intermodulation caused by strong unwanted stations during search. High : Local (attenuator on), only during search. Low : DX (attenuator off), always during stable tuning.
		I	If this pin is connected to ground, this function is not available. If local/DX key available then the search threshold will be changed by local/DX switching.
42	LOUDN	O	Loudness control. This pin can be used to switch loudness on/off in case no digital sound control IC is used. High : Loudness off Low : Loudness on
		I	loudness control is not available when this pin is connected to ground.
43	AUMUTE	O	General mute control. This pin can be used to control general audio muting in case no sound control IC is used. High : Muted Low : Not muted
44	CENABL	O	Cassette Enable. Controls the cassette deck motor. High : Cassette motor off Low : Cassette motor on
		I	Option diode for detachable keyboard detection.

PIN	NAME	I / O	DESCRIPTION
21	AMS	O I	Automatic Music Search indication. With this pin, the AMS feature of the cassette deck can be switched on/off. High : AMS is on Low : AMS is off If the cassette deck has no AMS feature, this pin must be connected to ground
22	KEYB4	I / O	See KEYB0 to KEYB2
23	SDA_ FRONT	I / O	Data line of front panel I ² C bus. The detachable front has a separate I ² C bus, for which measures may be taken to reduce interference and to improve immunity for static charges. Also, it isolates the other radio parts from the externally accessible contacts. The front panel I ² C bus controls the display driver and the 8-bit bi-directional I/O expander to which the keyboard matrix is connected.
24	SCL_ FRONT	I / O	Clock line of front panel I ² C bus.

① Factory selectable options

■ Diode options

The next options can be selected by means of option diodes :

(The table describes the situation that occurs when the diode is present)

DIODE	PIN	DESCRIPTION
D214	33	NO LW Band. The LW band is skipped when stepping through the bands with the band key.
D215	32	No security code handling. User functionality related with security is disabled. - Entry of security code - Enable / disable security code

■ Automatically detected options

CCR526S will detect the next options automatically :

- Digital sound control circuit.

Presence / absence of a TEA6330 is detected by testing its I²C bus address.

NOTE : The output pins AUMUTE, LOUDN and TA are always operational, even when a digital sound control chip is installed

- CD changer with a 6-disc magazine.

Presence of the CD changer (CDC) is detected by testing whether CD changer is transmitting data via the CDC-bus.

- AMS)

DOLBY) These functions are not available if the corresponding

MTL) output pin is connected to ground.

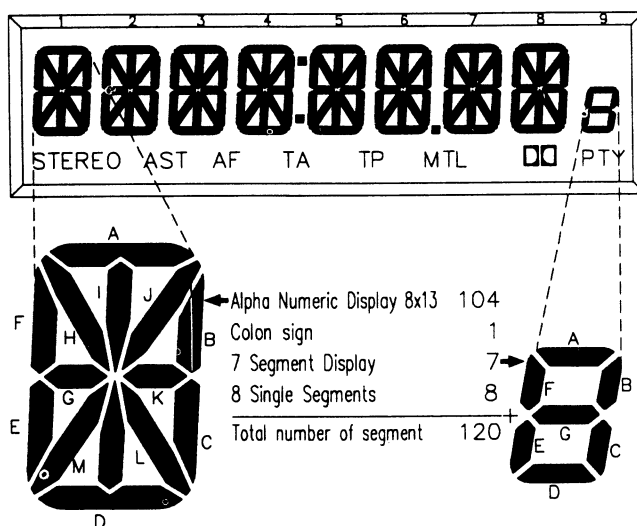
LOUDNESS)

① LC display

The display consists of the next fields :

- Text field for 8 alpha-numerical characters;
- Numerical digit for display of the preset number;
- 8 Icons for : STEREO, AST, AF, PTY, TA, TP, DOLBY and MTL.

Figure 1 shows a possible layout of the display

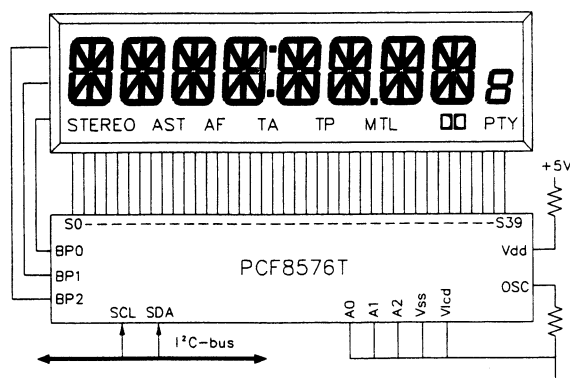


【 Figure 1 】 Liquid Crystal Display (LCD)

The 120 segment display is driven by a PCF8576. The display operates in 1:3 multiplex mode (3 backplanes BP0, BP1 and BP2) and a 1/3 (4 levels) LCD bias configuration.

Figure 2 gives the diagram of the display module.

Appendix II defines the connection of the segments of the display. Appendix III shows the character set.



【 Figure 2 】 Display module for 120 segments with PCF8576

■ Segment addresses for 120 segment display

PIN	NAME	I / O	DESCRIPTION
S0	digit 9 seg F	digit 8 seg B	digit 8 seg C
S1	digit 8 seg L	digit 8 seg J	digit 8 seg K
S2	digit 8 seg D	digit 8 seg A	digit 8 seg I
S3	digit 8 seg M	digit 8 seg H	digit 8 seg G
S4	digit 9 seg E	digit 8 seg F	digit 8 seg E
S5	digit 9 seg D	digit 7 seg B	digit 7 seg C
S6	digit 7 seg L	digit 7 seg J	digit 7 seg K
S7	AST	digit 1 seg B	digit 1 seg C
S8	digit 1 seg L	digit 1 seg J	digit 1 seg K
S9	digit 1 seg D	digit 1 seg A	digit 1 seg I
S10	digit 1 seg M	digit 1 seg H	digit 1 seg G
S11	STEREO	digit 1 seg F	digit 1 seg E
S12	TP	digit 4 seg B	digit 4 seg C
S13	digit 4 seg L	digit 4 seg J	digit 4 seg K
S14	digit 4 seg D	digit 4 seg A	digit 4 seg I
S15	digit 4 seg M	digit 4 seg H	digit 4 seg G
S16	digit 9 seg G	digit 4 seg F	digit 4 seg E
S17	TA	digit 3 seg B	digit 3 seg C
S18	digit 3 seg L	digit 3 seg J	digit 3 seg K
S19	digit 3 seg D	digit 3 seg A	digit 3 seg I
S20	digit 3 seg M	digit 3 seg H	digit 3 seg G
S21	digit 9 seg B	digit 3 seg F	digit 3 seg E
S22	AF	digit 2 seg B	digit 2 seg C
S23	digit 2 seg L	digit 2 seg J	digit 2 seg K
S24	digit 2 seg D	digit 2 seg A	digit 2 seg I
S25	digit 2 seg M	digit 2 seg H	digit 2 seg G
S26	digit 9 seg A	digit 2 seg F	digit 2 seg E
S27	digit 9 seg C	digit 5 seg F	digit 5 seg E
S28	digit 5 seg M	digit 5 seg H	digit 5 seg G
S29	digit 5 seg D	digit 5 seg A	digit 5 seg I
S30	digit 5 seg L	digit 5 seg J	digit 5 seg K
S31	MTL	digit 5 seg B	digit 5 seg C
S32	DOLBY	digit 6 seg F	digit 6 seg E
S33	digit 6 seg M	digit 6 seg H	digit 6 seg G
S34	digit 6 seg D	digit 6 seg A	digit 6 seg I
S35	digit 6 seg L	digit 6 seg J	digit 6 seg K
S36	colon-sign " : "	digit 6 seg B	digit 6 seg C
S37	PTY	digit 7 seg F	digit 7 seg E
S38	digit 7 seg M	digit 7 seg H	digit 7 seg G
S39	digit 7 seg D	digit 7 seg A	digit 7 seg I

KEY FUNCTIONS

KEY	DESCRIPTION
POWER	<p>When the radio is off, this key generates a reset pulse to start the microcontroller. The voltage stabilizer is switched on, but the radio will start playing only after the key is released. When security is enabled and the radio has been removed from the retrack or the +12V supply has been interrupted, the security code must be entered; else the radio will start playing in the mode it was in when switched off.</p> <p>Pressed while the radio was on, the radio is switched off. It saves all information about its current setting and restores the information when switched on again.</p>
BAND	<p>Step cyclically through the tuning bands (not accessible in Cassette & CD changer mode) in the order :</p> <p style="padding-left: 40px;">FM-1 -> FM-2 -> MW -> LW -> FM-1 -> * LW option</p> <p style="padding-left: 40px;">FM-AST -> FM-1 -></p> <p style="padding-left: 40px;">MW-AST -> MW -></p> <p>Depending on the installed option diodes, the LW band and the MW bands may be skipped.</p> <p>When a new band is selected, the radio tunes to the preset or frequency that was last used in that band.</p> <p>While entering the security code, this key serves to enter the currently displayed digit and to move to the next position of the security code.</p> <p>In user option programming mode, this key is used to toggle the currently displayed option :</p> <p style="padding-left: 40px;">2 SPKRS <-> 4 SPKRS LOUD OFF <-> LOUD ON TA LVL -2 <-> -1...0...+1...+2</p> <p>When pressed for more than 4 seconds (until the radio bleeps), the entry procedure for security enable/disable toggle is started (only when not disabled by factory option). When the correct security code is entered, the security enabled/disabled status will be toggled. (This function is also accessible in Cassette & CD changer mode)</p> <p>When the radio is in service mode (pin BLPTST connected to ground), the security code can be preprogrammed when pressing this key for 4 seconds.</p>
AST	<p>When pressed short (not in Cassette & CD changer mode) :</p> <ul style="list-style-type: none"> - If the radio is in FM-1 or FM-2 band, it switches to FM-AST band. - If the radio is in MW band, it switches to MW-AST band. - In other bands, nothing happens. <p>In the new band, the radio selects the preset or frequency that was last used in that band.</p> <p>When pressed longer than 2 seconds (until the radio bleeps) :</p> <p>The radio switches to FM-AST or MW-AST band as described above and starts an AST search in that band. (Not in the LW band). During the AST search the TA mode is ignored. In an AST search, the whole band is scanned and the 6 strongest stations are stored in the 6 preset locations, strongest station first.</p> <p>When less than 6 stations are found, higher preset locations are not changed. When the AST search is completed, the radio bleeps and selects preset 1.</p> <p>While entering the security code, this key serves as a "backspace" key. It switches back to the previous position and allows to make corrections on that digit.</p>

KEY	DESCRIPTION																																
FREQ UP FREQ DOWN	<p>These keys are used for tuning. Operation depends on the auto/manual switch. (freq-up & freq-down keys have alternative functions in Cassette & CD changer mode)</p> <p>The preset number is removed from the display when the radio was previously in preset mode (a preset number was displayed).</p> <p>The radio will be muted during tuning.</p> <p>The display will show at any moment the band and actual frequency.</p> <p>When the two keys are pressed together, the radio switches between search/manual tuning just as if the auto/manual key is pressed. This can be used as an alternative for the auto/manual key.</p>																																
FREQ UP FREQ DOWN	<p>Automatic tuning mode :</p> <p>The radio will increment/decrement the frequency until a new station is found. At the end of the band it will wrap around and continue on the other side. If after one bandsweep no station is found and the radio is in local mode, the radio will switch to DX mode and restarts searching. The search will stop after one complete sweep in DX mode.</p> <table><tr><td>Band</td><td>Frequency step size</td></tr><tr><td>FM</td><td>100kHz</td></tr><tr><td>MW</td><td>9kHz</td></tr><tr><td>LW</td><td>1kHz</td></tr></table> <p>In FM :</p> <p>- When TA mode is on, the search will only stop on stations which are traffic stations.</p> <p>Manual tuning mode :</p> <p>The radio will increment/decrement the frequency as long as the freq- up/down key is pressed. The radio will go back to automatic tuning mode when the freq-up/down keys are not used for 6 seconds.</p> <table><tr><td>First 2.5 seconds</td><td>Band</td><td>Frequency step size</td></tr><tr><td></td><td>FM</td><td>50kHz</td></tr><tr><td>5 steps/second</td><td>MW</td><td>1kHz</td></tr><tr><td>de-mute when key released</td><td>LW</td><td>1kHz</td></tr></table> <table><tr><td>After 2.5 seconds</td><td>Band</td><td>Frequency step size</td></tr><tr><td></td><td>FM</td><td>100kHz</td></tr><tr><td>12.5 steps/second</td><td>MW</td><td>9kHz</td></tr><tr><td>de-mute when key released</td><td>LW</td><td>1kHz</td></tr></table>	Band	Frequency step size	FM	100kHz	MW	9kHz	LW	1kHz	First 2.5 seconds	Band	Frequency step size		FM	50kHz	5 steps/second	MW	1kHz	de-mute when key released	LW	1kHz	After 2.5 seconds	Band	Frequency step size		FM	100kHz	12.5 steps/second	MW	9kHz	de-mute when key released	LW	1kHz
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12.5 steps/second	MW	9kHz																															
de-mute when key released	LW	1kHz																															
(Continued) FREQ UP FREQ DOWN	<p>In CD changer mode, these keys have alternative functions :</p> <p>- freq-down Pressing this key short : track-up The current track number is incremented by one (wrap around at the end of the disc to the first track of the current disc). If shuffle disc mode is active, a track of the current disc starts to play in random order. If shuffle all mode is active, a random track of a random disc starts to play.</p>																																
TRACK UP																																	
FFORWARD	<p>Pressing this key longer than 2 seconds (until the radio beeps) the fast forward mode is entered. While pressing the fast-forward key, the CD changer will repeatedly jump some grooves forward in successive order during the playing of the disc. If the end of the track/disc is reached, the CD changer jumps to the next track/disc unless repeat mode is active. The repeat and shuffle mode remain active during the fast forward mode and scan mode is cancelled.</p>																																

KEY	DESCRIPTION
TRACK DOWN	- freq-down Pressing this key short : track-down. The current track number is decremented by one (wrap around at the begin of the disc to the last track of the current disc) If shuffle mode is active, the current track is restarted.
FREVERSE	Pressing this key longer than 2 seconds (until the radio bleeps) the fast reverse mode is entered. While pressing the fast-reverse key, the CD changer will repeatedly jump some grooves back ward in successive order during the playing of the disc. If the beginning of the track is reached, the CD changer jumps to the previous track unless repeat mode is active. The repeat and shuffle mode remain active during the fast reverse mode and scan mode is cancelled. During entry of the security code, the freq-up/down keys are used to increment/decrement a digit of the security code. When the correct number has been reached, press the band key to enter it and move on to the next position. The code consists of 4 digits ranging from 0 to 9. The function wraps around if the end of the range is reached. In PTY programming mode, the freq-up/down keys are used to step through the available PTY codes. In user option programming mode, the freq-up/down keys are used to step through the available options. Each option can be toggled with the band key.
SCAN	Frequency Scan. Continuous automatic search tuning, pausing for 6 seconds on every station found. The search direction is always search up and the algorithm is the same as for the normal search (see keys freq-up/down).
INTRO SCAN	In CD changer mode : When pressed short, the intro scan mode of the CD changer is toggled or in case the disc scan mode is active, this mode is cancelled. When intro scan mode is active, every track of the current disc is played for 10 seconds. In case the end of the disc is reached, the first track of the current disc is selected. The display will show "INT" If intro scan mode is off, every track is played completely.
DISC SCAN	When pressed longer than 2 seconds (until the radio bleeps), the set plays the first 10 seconds of each disc. The discs are played in successive order, starting with the 1'st disc in the magazine. In case the last disc is played, the set starts to play for 10 seconds, the first available disc in the magazine. The display will show "IND". When disc scan mode is off, the tracks are played in successive order and at the end of a disc the next disc in successive order is taken.
P1 ~ P6	When pressed short, these keys select a preset programme directly. The AF follow mode on/off state will be set according to the state stored in NVM. When pressed longer than 2 seconds (until the radio bleeps), these keys serve to store the current station in the NVM. In FM, the state of the AF follow mode on/off switch is stored together with the frequency. Also the RDS PI code, programme service name and AF list are stored.
AMS (option)	In cassette mode, some of these keys have alternative functions : - P4 Switch the AMS function on/off (With detachable keyboard only) Display during winding : "CAS WIND" (AMS off) "AMS WIND" (AMS on) while playing : "PLAY>>" (AMS off) "PLAY >" (AMS on)

KEY	DESCRIPTION
MTL (option)	- P5 Switch MTL mode on/off When on, the MTL icon will be on.
(continued) P1 ~ P6	In CD changer mode, some of these keys have alternative functions.
DISC up	- P2 When the key disc-down is pressed, the previous slot (wrap around if necessary) that contains a disc is selected. The first track of the selected disc starts to play unless shuffle disc mode is active. If shuffle all mode is active the CD changer switches to a random slot that contains a disc and starts to play a random track. When the CD changer is switching to another disc, the disc number starts to blink until the selected disc is loaded.
SHUFFLE DISC	- P3 When the key disc-up is pressed, the next slot (wrap around if necessary) that contains a disc is selected. The first track of the selected disc starts to play unless shuffle disc mode is active. If shuffle mode is active the CD changer switches to a random slot that contains a disc and starts to play a random track. When the CD changer is switching to another disc, the disc number starts to blink until the selected disc is loaded.
SHUFFLE ALL	- P4 When the key shuffle is pressed short, shuffle disc mode is toggled on/off. In case shuffle all mode is active, shuffle all mode is cancelled. In shuffle disc mode the tracks of the current disc are infinitely played in random order. The display will show "SFD". When shuffle disc mode is off the tracks of the current disc are played in successive order. When the key is pressed for longer than 2 seconds (until the radio beeps), shuffle all mode becomes active. In shuffle all mode all tracks of all discs are infinitely played in random order. The display will show "SFA". When shuffle all mode is off, the tracks of the current disc are played successively and if the end of the disc is reached, the next disc in successive order is taken and the first track of that disc starts to play.
REPEAT TRACK	- P5 When the key repeat is pressed short, repeat track mode is toggled on/off. In case repeat disc mode is active, repeat disc mode is cancelled. In case repeat track mode is active, the current track is played continuously until repeat track mode is switched off. The display will show "RTT". When repeat track mode is off, the next track will be selected after the current track is played.
REPEAT DISC	When the key is pressed for longer than 2 seconds (until the radio beeps), repeat disc mode is activated. When repeat disc mode is on, the current disc will be played repeatedly. (When the last track of the disc is played, the first track of the current disc is selected.) The display will show "RTD". When repeat disc mode is off, the next disc will be selected.
PTY	This key is active only if the radio is in FM. When pressed the current received PTY code is displayed. In case no PTY code is received "NO PTY" is displayed. The user can now select a PTY code with the freq-up/down keys. When no key was pressed for 6 seconds, the radio returns to normal mode again. The PTY search is started by pressing the SCAN key. A search is started for the selected PTY code. If a PTY code is received the PTY icon is on. During PTY scan the PTY icon is flashing.

KEY	DESCRIPTION
MUTE	<p>This key serves to switch the "muted" state on/off.</p> <p>When muted :</p> <ul style="list-style-type: none"> - All audio output is suppressed - The text "MUTE" is displayed. <p>The muted state is switched off, when the mute key is pressed again or when any other key is pressed.</p> <p>The muted state will be temporarily suspended when the radio is in TA mode and a traffic announcement is received or when a PTY alarm message is received.</p>
MODE	<p>This key is used to overrule the default selection of the audio source : radio, cassette or CD changer.</p> <p>Each time the key is pressed, the next input source is selected in the order : Radio -> Cassette -> CD changer</p> <p>with the restrictions :</p> <ul style="list-style-type: none"> - Cassette is selected only if a tape is present in the cassette deck. - CD changer is selected only if a CD changer is connected.
DISPLAY	<p>By default, the display will show the programme service name of the current station or - when not available - the band and frequency.</p> <p>The display key serves to show available information :</p> <ul style="list-style-type: none"> - Programme TYpe name - Band and frequency - Programme Service name <p>Each time this key is pressed, the display changes to the next item in the list. If an item is not available, it is skipped.</p> <p>When the display key is not used for 6 seconds or when any other key is pressed, the display returns to the default state.</p> <p>In CD changer mode :</p> <p>In normal operation mode, the current disc number and the current played track number (separated by a colon) are displayed.</p> <p>When the display key is pressed, the elapsed track time in minutes and seconds (also separated by a colon) is displayed for 6 seconds. During the display of the elapsed track time, the colon-sign is blinking.</p>
TA	<p>This key is active only if the radio is in FM.</p> <p>It serves to seitch TA mode on/off.</p> <p>When TA mode is on and a traffic announcement is transmitted :</p> <ul style="list-style-type: none"> - If the radio is muted, it will be de-muted for the duration of the traffic announcement. - If the radio was in cassette of CD changer mode, it will switch temporarily to radio mode. - Temporary switch over to an EON linked programme when EON detects a traffic announcement on that other programme. - If the volume setting was very low, it will be raised temporarily to one of 5 fixed volume levels selected under options programming. If the user did not change the volume setting, it will return to the original value at the end of the traffic announcement. - The TA icon blinks. <p>The current traffic announcement can be cancelled by pressing the TA key, the TA mode will not be switched off. This can be useful to cancel for example an unwanted EON traffic announcement</p>

KEY	DESCRIPTION
AF	<p>When pressed short :</p> <p>Switches AF follow mode on/off.</p> <p>The state of the AF follow mode is displayed by the AF Icon :</p> <p>locon off : AF follow mode off</p> <p>Icon on : AF follow mode on; RDS reception OK.</p> <p>Icon blinking : AF follow mode selected, but no RDS data received.</p> <p>When AF follow mode is on, the radio will from time to time measure the signal strength of the alternative frequencies that come with the RDS data. The interval between measurements depends on the signal quality of the current station, in the order of 1 minute for strong stations to a few seconds for weak stations. When the radio finds an alternative that is in several successive measurements - stronger than the current frequency, it switches over to that frequency.</p>
REGIONAL	<p>When pressed longer than 2 seconds (until the radio beeps) :</p> <p>Displays regional mode status and allows switching the regional mode on/off.</p> <p>The current state of the regional mode is indicated by a message "REG ON" or "REG OFF" displayed for 4 seconds after the key is pressed. When - within this time - the key is pressed again short, the state is toggled and the new state is displayed, again for 4 seconds.</p> <p>To check whether an alternative frequency is a real alternative for the current station the radio compares PI codes.</p> <p>Regional mode is on :</p> <p>The PI codes must be exactly identical.</p> <p>Regional mode is off :</p> <p>The region identification code in the PI code is ignored.</p> <p>When regional mode is off, the radio may switch from a national programme to a local variant of that programme or from a local station in one area to a local station in another area. When regional mode is on, the radio will only switch to an alternative that broadcasts exactly the same programme. For the USA application (RBDS) the regional function (switching to regional variants) will only work for PI codes above B000 hex.</p>
VOL UP, VOL DOWN	<p>These keys are installed only if a digital sound control chip is installed.</p> <p>The vol-up and vol-down keys increment/decrement the setting of the current analogue function. The setting is changed with 4 steps per second, as long as the key is held down or until the end of the range has been reached. For volume, balance and fader, each step is 2 dB, for bass and treble each step is 3 dB.</p> <p>By default, volume is changed. No indication on the display is given in that case.</p> <p>With the select key, the function on which the vol-up and vol-down keys operate can be changed to : bass, treble, balance or fader. (See select key description).</p>
SELECT	<p>This key is installed only if a digital sound control chip is installed.</p> <p>When pressed short :</p> <p>It changes the function on which the vol-up, vol-down keys operate to : bass, treble, balance or fader. Each time the key is pressed, the next function is selected.</p> <p>The fader function is only available if the 2/4 loudspeakers option in the user programme options was set to "4 SPKRS" and the diode option 2/4 spkrs is set to 4 spkrs.</p> <p>By default, the vol-up and vol-down keys operate on volume. When none of the keys select, vol-up or vol-down is used for 6 seconds or when any other key is pressed, the default function volume is restored.</p>

KEY	DESCRIPTION
SELECT	<p>When pressed longer than 4 seconds (until the radio bleeps) : User option programming mode is entered.</p> <p>In this mode the user can select the next options :</p> <ul style="list-style-type: none"> - 2-Loudspeakers / 4-Loudspeakers, (in 2-speaker mode, the fader function is not available). - Loudness on/off, (alternative for the loudness key, if loudness option is available). - TA / PTY volume level. <p>The freq-up/down keys must be used to step through the functions that can be selected. The band key must be used to toggle an option.</p> <p>The user option programming mode is left when the select key is pressed again, when none of the keys select, freq-up/down or band is pressed for 6 seconds or when any other key is pressed.</p>
LOUDNESS	<p>When pressed short : Displays the current state of loudness mode and allows switching the loudness state on/off.</p> <p>When the key is first pressed, it displays the message "LOUD ON" or "LOUD OFF" for 4 seconds. If pressed again within that period, the state is toggled and the new state is displayed - again for 4 seconds.</p> <p>When loudness is on, bass and treble are added to the analog settings dependent on the volume setting.</p>
RESET	<p>When pressed longer than 4 seconds (until the radio bleeps) : Performs an analogue reset function : bass, treble, balance and fader are set to mid-range and loudness is switched off.</p>

① CD changer source

■ Interconnection between the CD changer and the main microcontroller

The communication between the main microcontroller CCR526S and the CD changer takes place using a single line (CDC-bus) connected to pin 9 of CCR526S microcontroller.

The communication link is a asynchronous serial bus with a communication speed of 2.5 msec/bit.

■ CD changer functions

The state of the CD changer can be in one of the following modes :

CD changer modes	
Normal play	
scan (P6)	intro scan
	disc scan
shuffle (P4)	shuffle disc
	shuffle all
repeat (P5)	repeat track
	repeat disc

Note : the modes are exclusive! The default mode is the normal play mode.

□ Normal play

The normal play situation of the CD changer, which is default, exists of playing the tracks in successive order and after reaching the end of a disc, the next disc is taken in successive order (wrap around if necessary) and the first track of that disc starts to play.

In case the TOC of the current disc can not be read, an error is displayed together with the disc number ("ERR 05.00"). The user has the possibility to go to another disc with the keys "disc-up", "disc-down" or "shuffle all".

□ Scan (P6)

There are two scan functions which are only available in CD changer mode :

- intro scan :

This function allows the user to familiarize with the selected disc. When intro scan mode is active (press key "P6" short), every track of the current selected disc is played for maximum 10 seconds.

When the end of the disc is reached, the disc is repeated automatically.

The intro scan mode can be toggled on/off by using key : "scan".

- disc scan :

This function is useful to review the contents of the magazine. When disc scan mode is active, the first 10 seconds of every disc is played. The discs are played in successive order.

The disc scan function is switched on by pressing the key "P6" for more than 2 seconds (until the radio beeps) and is switched off by pressing the key "scan" shortly.

The following events cancel scan mode :

- Pressing the key "P6" short;
- Selection of an other audio source (inserting a tape in the cassette drive, pressing the key "MODE");
- Selecting on of the other CD changer modes;
- Selection of an other disc or track;
- Activating the function Fast Forward or Fast Reverse;
- Switching off the radio (not stored in NVM).

□ Shuffle (P4)

There are two shuffle functions which are only available in CD changer mode :

- shuffle disc;

When shuffle disc mode is active (press key "shuffle" short), the tracks of the current selected disc are played in random order. When all tracks of the current disc are played, the CD changer restarts to play the tracks of the current disc in random order.

- shuffle all;

The shuffle all mode is entered in case the key "shuffle" is pressed for longer than 2 seconds (until the radio bleeps).

In shuffle all mode, all tracks of all discs are infinitely played in random order.

The following events cancel shuffle mode :

- Pressing the key "shuffle" short;
- Selecting on of the other CD changer modes.

□ Repeat (P5)

There are two repeat functions which are only available in CD changer mode :

- repeat track ;

When repeat track mode is active (press key "repeat" short), the current selected track is played repetitive.

- repeat disc ;

Repeat disc mode is entered in case the key "repeat" is pressed for longer than 2 seconds (until the radio bleeps).

The current selected disc is played repetitive.

The following events cancel repeat mode :

- Pressing the key "repeat" short;
- Selecting one of the other CD changer modes.

□ Next/previous disc

In CD changer mode the user can select another disc by using the keys "disc-up" and "disc-down". Pressing one of these keys, the next or previous slot that contains a disc is selected. The first track of the selected disc starts to play unless shuffle disc mode is active. If shuffle all mode is active the CD changer will switch immediately to a random slot that contains a disc, and a random track starts to play.

□ Next/previous track

In CD changer mode the user can select another track by using the keys "track-up" and "track-down". Pressing one of these keys, the next or previous track is selected (wrap around if necessary). If shuffle disc mode is active, a random track starts to play immediately if "track-up" is pressed. In case the "track-down" key is pressed, the current track is restarted. If shuffle all mode is active, a random track from a random disc starts to play immediately if "track-up" is pressed. In case the "track-down" key is pressed, the current track is restarted.

□ Fast forward

Pressing the key "Fast Forward" (in CD changer mode) longer than 2 seconds (until the radio bleeps) the fast forward mode is entered. While pressing the "fast-forward" key, the CD changer will repeatedly jump some grooves forward in successive order during the playing of the CD. If the end of the disc is reached, the CD changer will switch to the next disc unless repeat mode is active. In case scan mode is active, this mode is cancelled. If the CD changer was in repeat or shuffle mode, this mode remains during the fast forward activation. With other words, if e.g. the repeat track mode is active and fast forward mode is entered, the CD changer will repeatedly jump some grooves forward until the end of the track is reached and jumps to the beginning of the track and the fast forward mode remains until the key is released.

□ Fast reverse

Pressing key "Fast Reverse" (in CD changer mode) longer than 2 seconds (until the radio bleeps) the fast reverse mode is entered. While pressing the "fast-reverse" key, the CD changer will repeatedly jump some grooves backward in successive order during the playing of the CD. If the beginning of the CD is reached, the CD changer starts to play the first track of the current disc. In case scan mode is active, this mode is cancelled. If the CD changer was in repeat or shuffle mode, the fast reverse action will stop when the beginning of the current track is reached and the CD changer starts to play the current track. The repeat and shuffle mode remain.

□ Switching to the CD changer

The radio can only switch to the CD changer when a CD changer is properly connected to the radio. The radio will check this link when the radio is switched on. Connecting the CD changer when the radio is operational will result no effect.

When the radio switches to CD changer mode and there are no discs in the magazine, the radio will be muted and the display will indicate that there is no disc available. The radio will stay in CD changer mode.

When the radio switches to CD changer mode and the CD changer was disconnected during radio operation, the radio will neverending try to communicate with the CD changer.

□ CD changer display messages

In CD changer mode, the following display message are available on the main display :

"SFD 10.16"	Shuffle disc mode is active; track number 16 of disc number 10 is played.
"SFA 4.02"	Shuffle all mode is active; track number 2 of disc number 4 is played.
"RTT 3.11"	Repeat track mode is active of the current selected track number 11 on disc 3.
"RTD 6.10"	Repeat disc mode is active of disc number 6. Current played track is number 10.
"INT 4.05"	Intro scan mode is on of disc number 4. Current played track is number 5.
"IND 7.01"	Disc scan mode is active, track number 1 if disc 7 is played.
"CD 8.07"	The normal play mode is active; track number 7 of disc number 8 is played.
"RTT 4.56"	Track repeat mode is active; the elapsed track time is 4 minutes and 56 seconds. When the display key is pressed, the elapsed track time in minutes and seconds (separated by a colon) is displayed for 6 seconds. The elapsed track time is the time the current track has played. During the display of the elapsed track time, the colon sign is blinking.
"CHANGER"	The CD changer is in its start-up phase.
"NO MAGAZ"	There is no magazine in the CD changer.
"NO DISC"	The magazine contains no disc at all.
"CD ERROR"	An error occurred.
"ERR 5.00"	An error occurred during the reading of the TOC of disc number 5.

● Audio control

Most of the audio control facilities are available only if a digital sound control chip is installed.

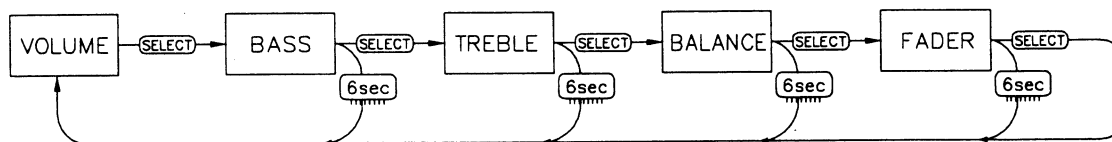
If no digital sound control chip is used, the next signals should be used in combination with potentiometer control :

- pin AUMUTE Mute status;
- pin LOUDN Loudness status;
- pin TA Traffic announcement or PTY alarm message in progress.

The volume at power on is limited to -10 dB when digital sound control is available.

■ The select key

By default, the vol-up and vol-down keys control the volume. To select other functions, press the select key short until the desired function is shown on the display. **Figure 1** shows how control functions are selected using the select key. If the 2-speaker option is selected in the diode options or in the user programmable options, the fader function is not available and the fader setting is always mid-range.



【Fig 1】 Selection of sound control functions

■ Changing a setting

To change a setting, press the vol-up or vol-down key until the desired level is reached. As long as a key is pressed, the selected function changes with 4 steps per second. The table below shows the control range and step size for the audio control functions.

The volume setting is not shown on the display. All other audio control settings are displayed on the LCD while adjusting the settings.

Function	Step size	Range
Volume	2 dB	muted, -66 dB to +20 dB
Bass	3 dB	-12 dB to +12 dB
Treble	3 dB	-12 dB to +12 dB
Balance	2 dB	left : muted, -30 dB to 0 dB right : 0 dB to -30 dB, muted
Fader	2 dB	front : muted, -30 dB to 0 dB back : 0 dB to -30 dB, muted

■ User programmable options

Some options can be programmed by the user, to customize the radio to his own preferences. The options are stored in NVM and remain in effect until reprogrammed by the user.

The options are :

2 SPKRS / 4 SPKRS

Indicates how many loudspeakers are connected to the radio. If "2 speakers" is selected, the fader function is not available and fader setting is always mid-range.

Note : This option is only available if the TEA6320 is present and the diode option 2/4 spkrs is set to 4.

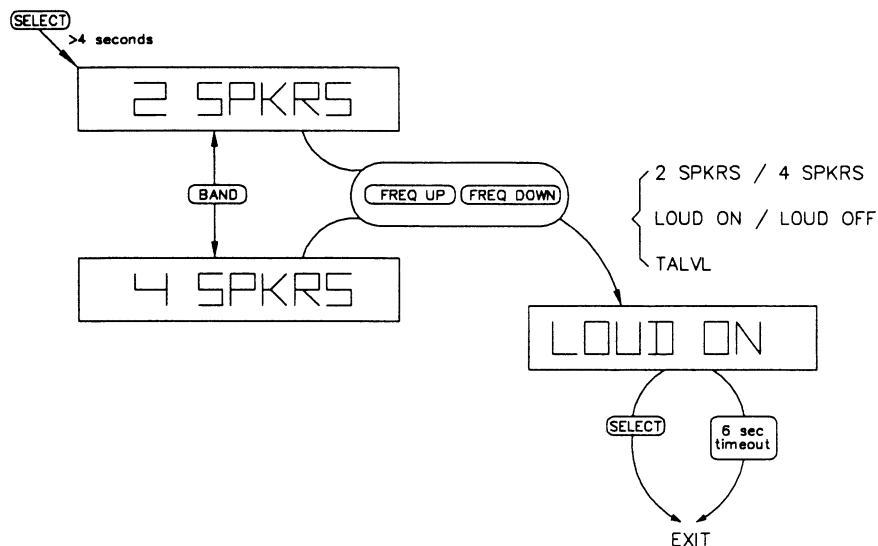
LOUD ON / LOUD OFF

If no loudness key is installed, loudness can be switched on/off. This only when the loudness function is factory selected.

TALVL -2 / -1 / 0 / +1 / +2

The volume level during a Traffic Announcement or PTY Alarm can be set to one of 5 fixed values varying from -12 dB to -4 dB in steps of 2 dB. When this function is selected during a Traffic announcement or PTY Alarm the volume level will change to the level selected.

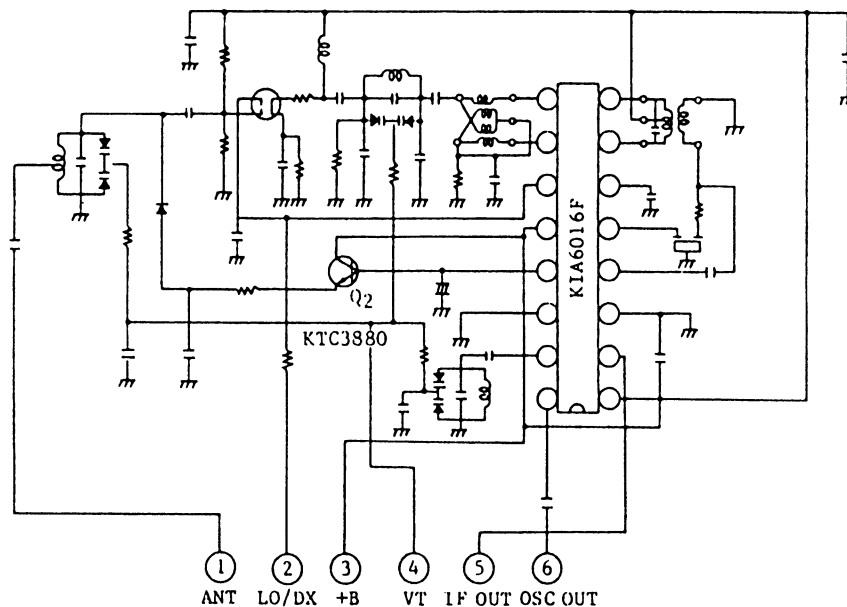
Figure 2 explains how user options can be programmed.



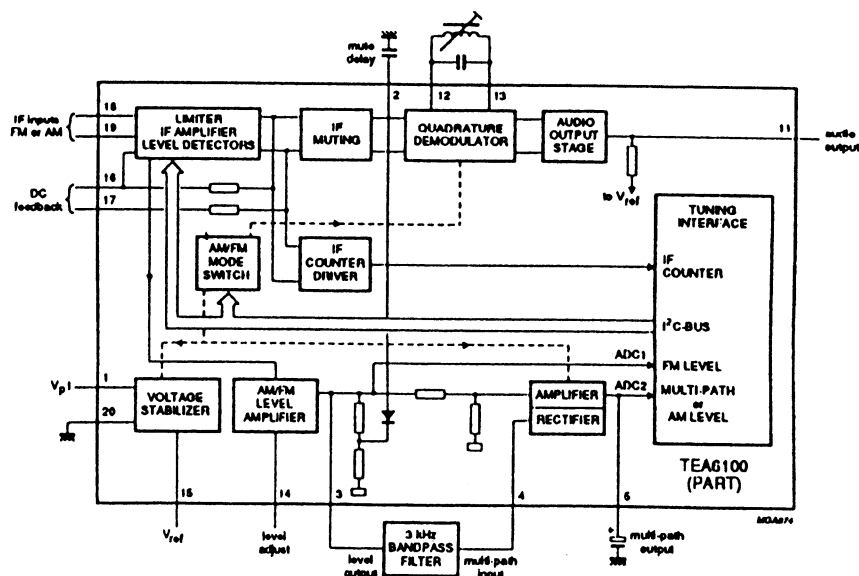
【Fig 2】 Programming user options

● IC BLOCK DIAGRAM

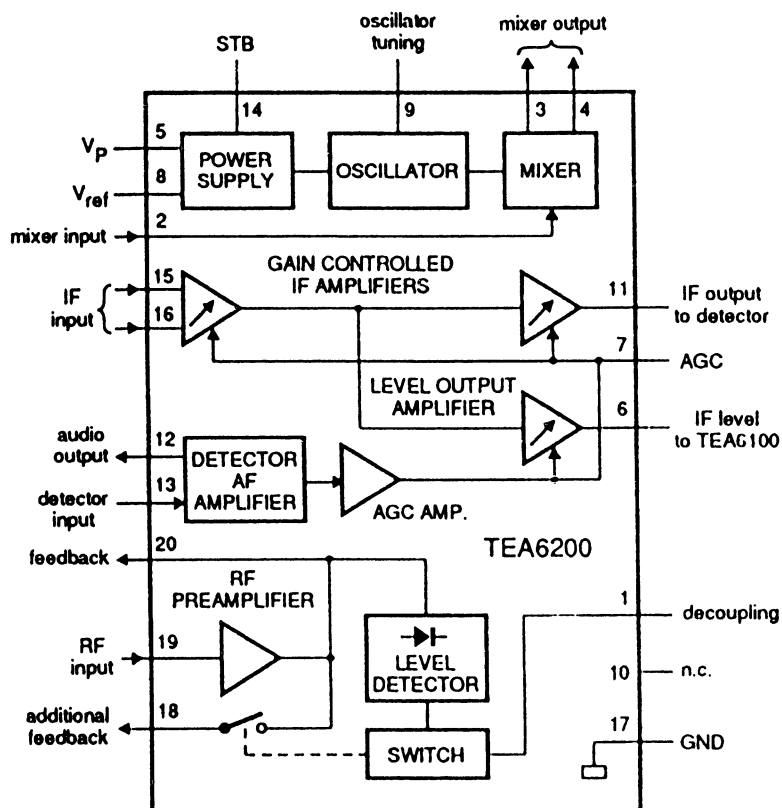
■ KCF-204VH (FM FRONT-END) : TU001 ■



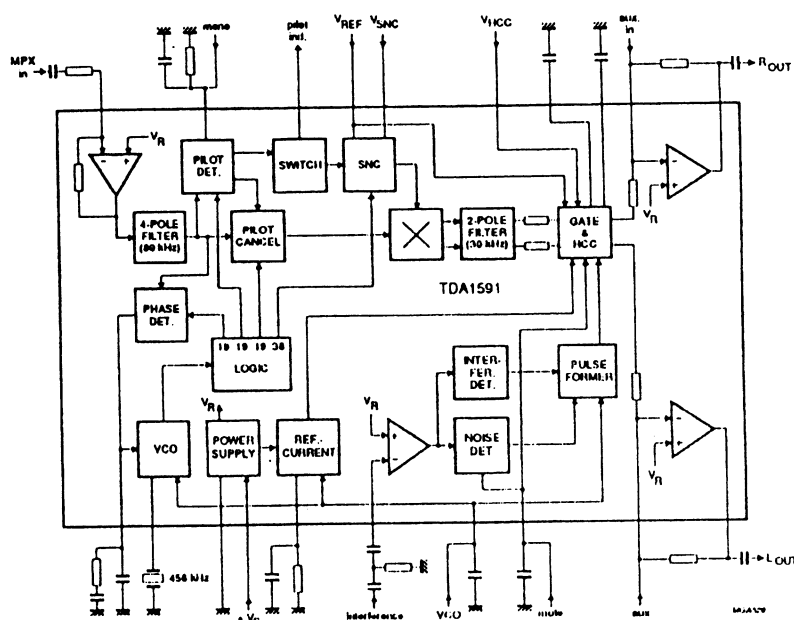
■ TEA6100 (ANALOG) : IC101 ■



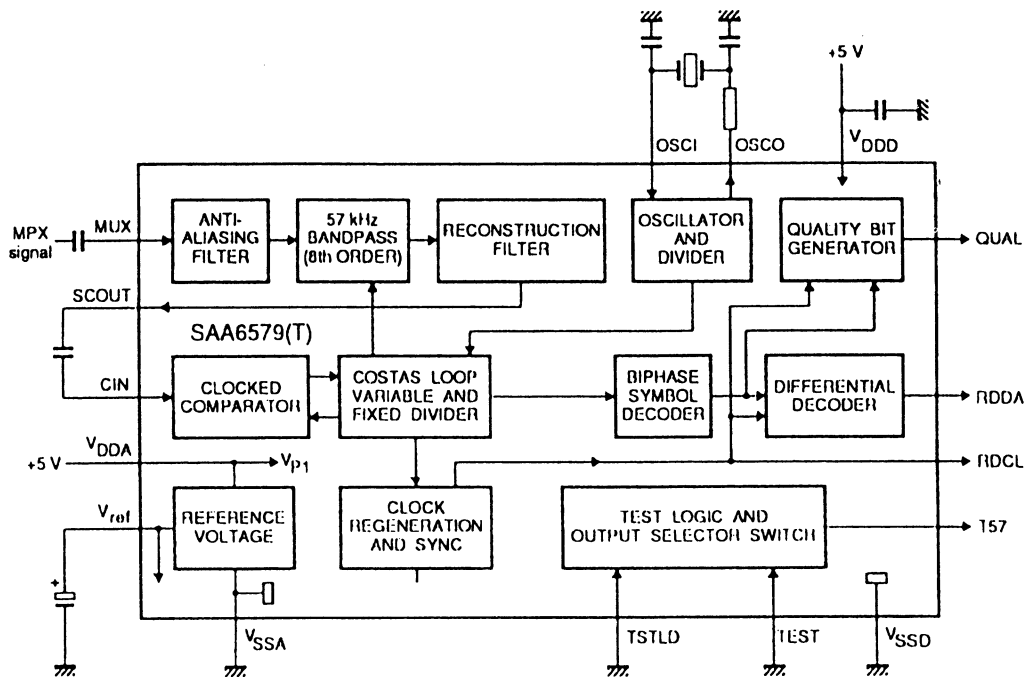
TEA6200 (IC AUDIO) : IC1



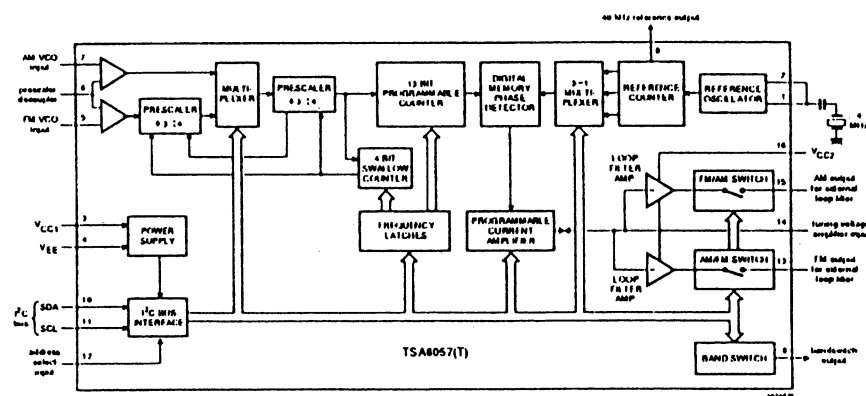
TDA1591T (IC MPX) : IC102



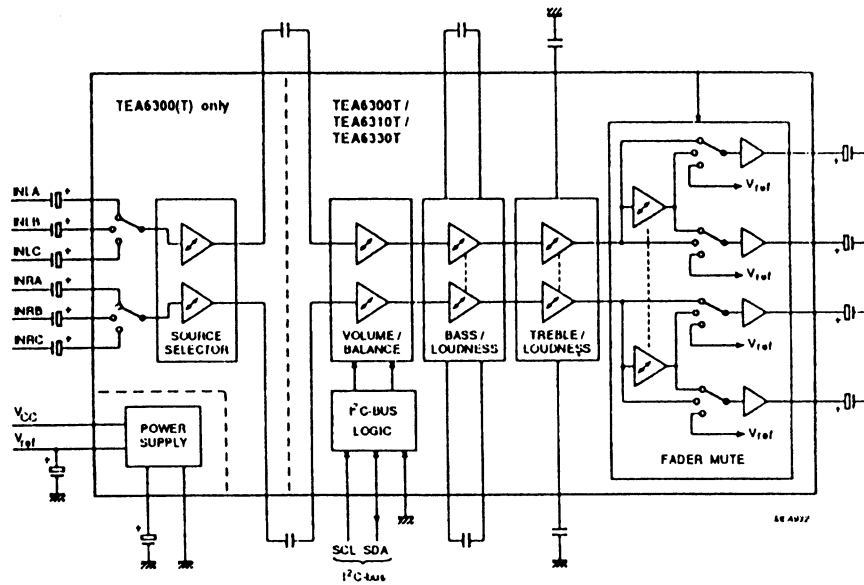
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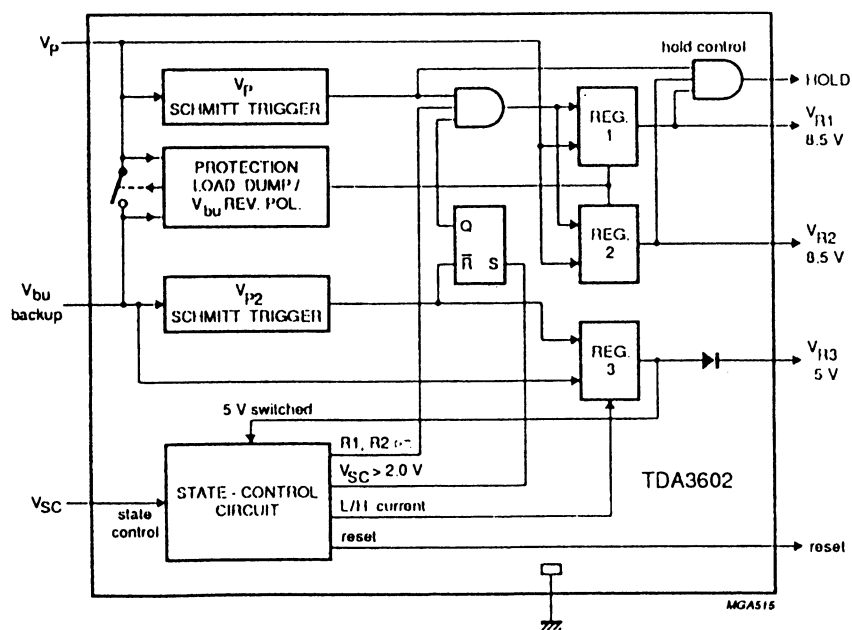
TSA6057T (IC PLL) : IC201



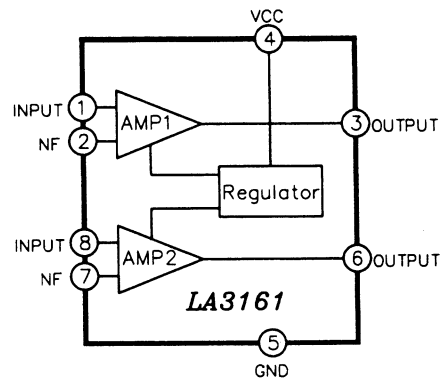
TEA6330T (IC AUDIO) : IC302



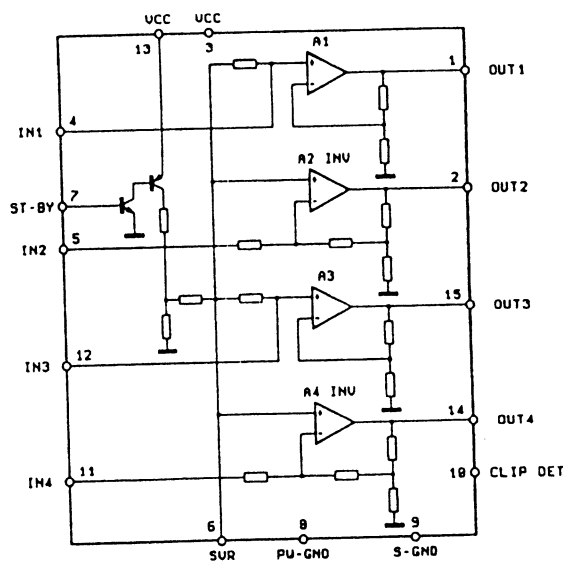
TDA3602 (IC REGULATOR) : IC204



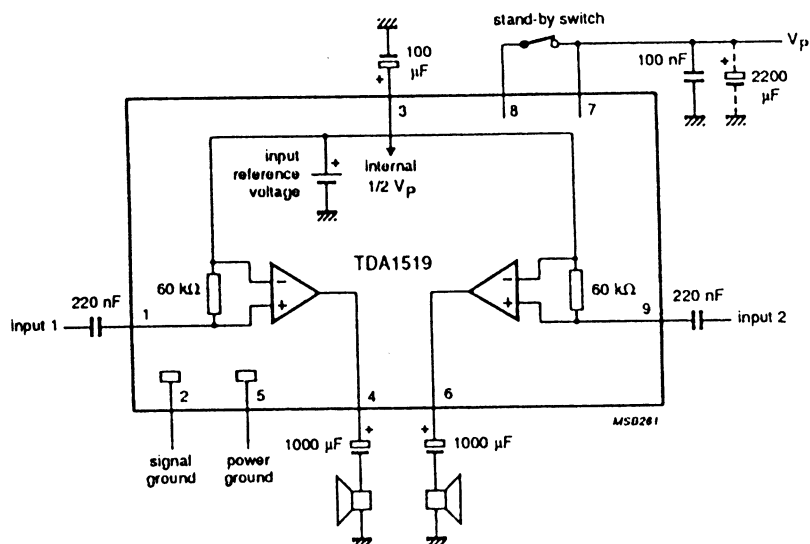
LA3161 (TAPE PRE-AMP) : IC301



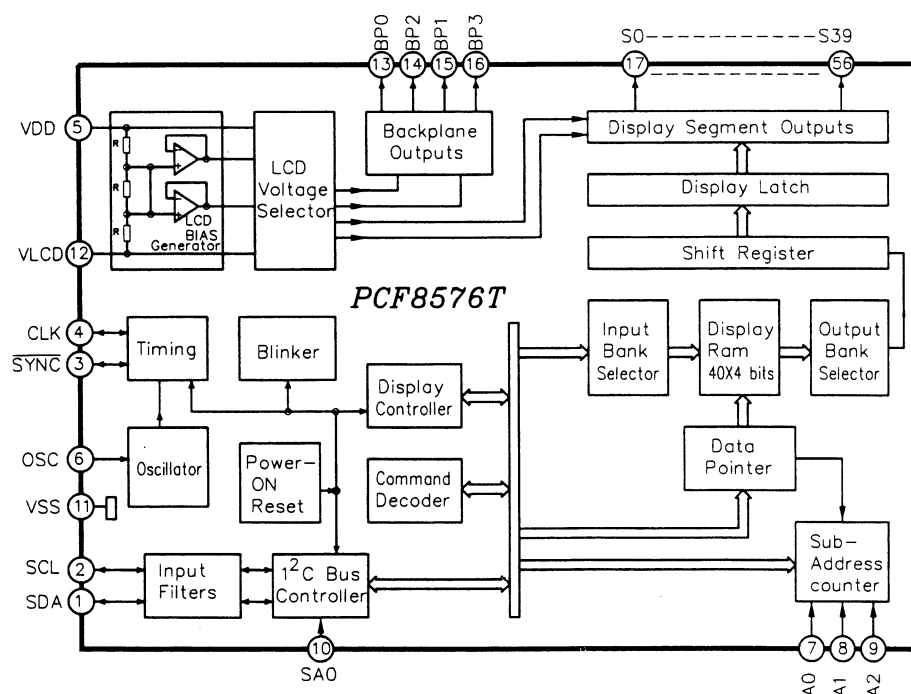
TDA7370A (POWER AMP) : IC303



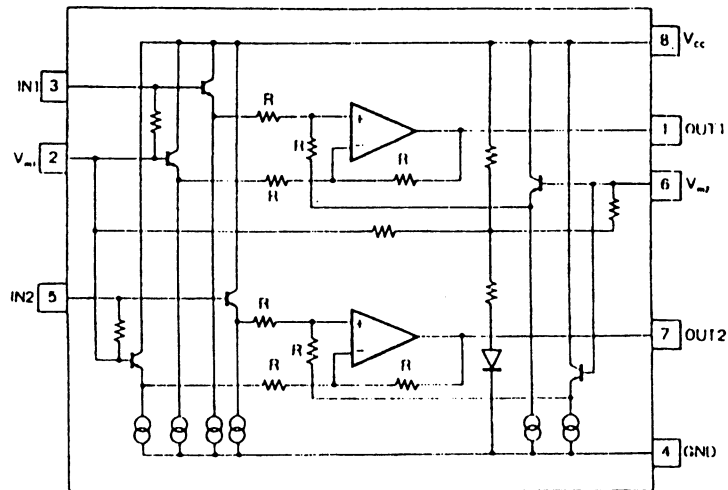
TDA1519 (IC MPX) : IC801



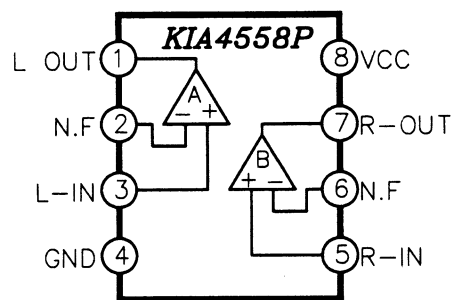
PCF8576T (IC DRIVER) : IC902



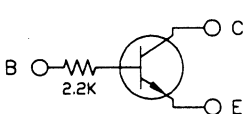
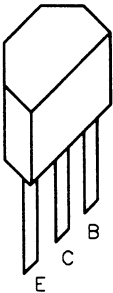
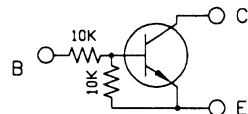
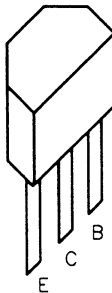
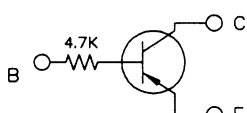
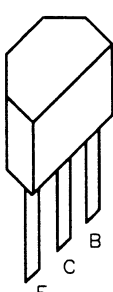
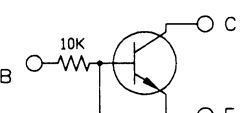
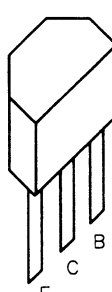
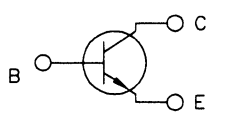
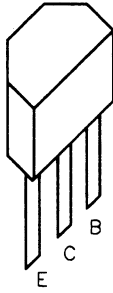
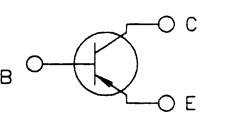
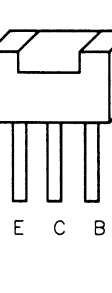
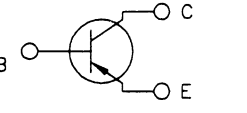
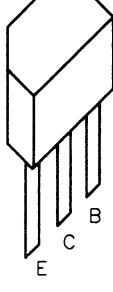
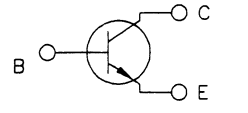
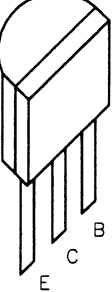
BA3121 (CDC OPTION : IC ISOLAION) : IC304



KIA4558P (IC OP AMP) : IC701



● TRANSISTOR PIN DESCRIPTION

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<p>KRA110M Q211</p>  	<p>KRC111M Q201 Q307 Q202 Q308 Q302 Q309 Q305 Q312 Q306 Q313 Q314 Q06</p>  
<p>KTC3199 Q203 Q204 Q205 Q03 Q05</p>  	<p>2SB1240R Q206 Q209 Q301</p>  
<p>KTA1267Y Q04</p>  	<p>KTC3192-O Q01</p>  

● WIRING DIAGRAM

